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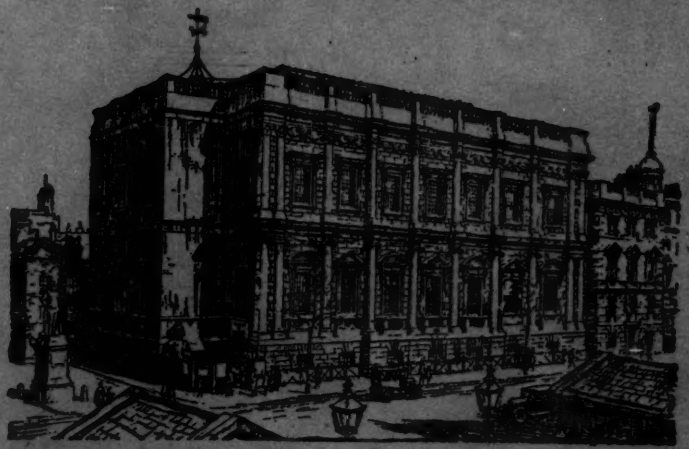

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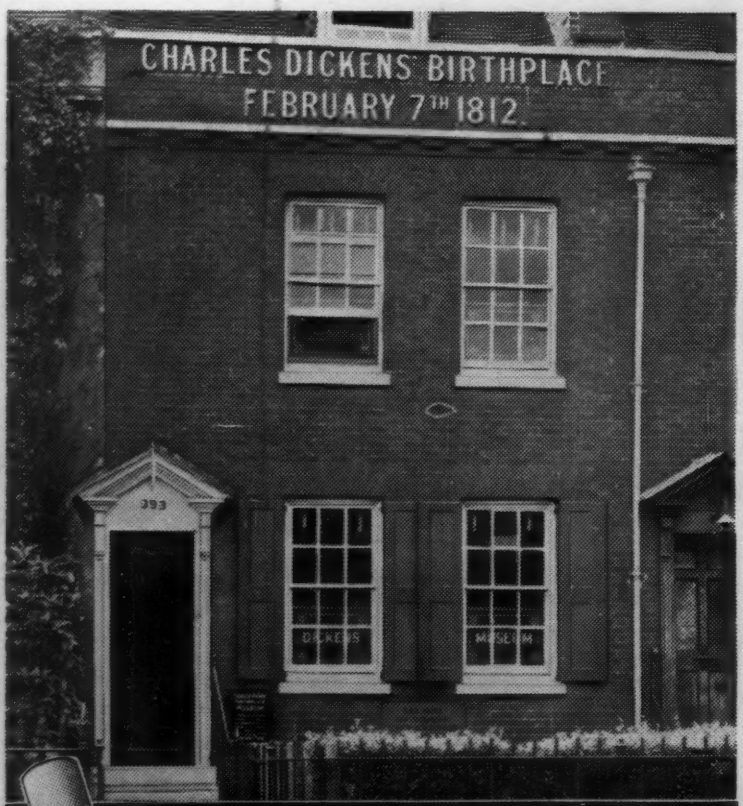

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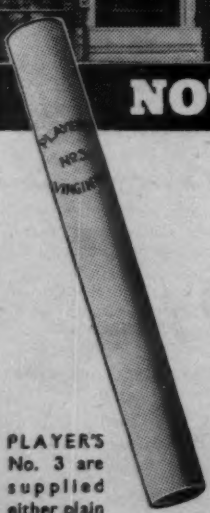

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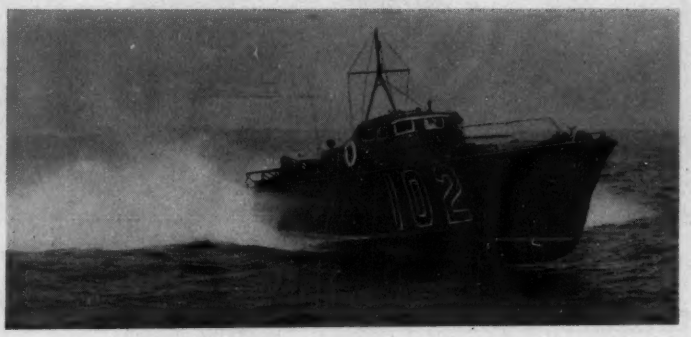

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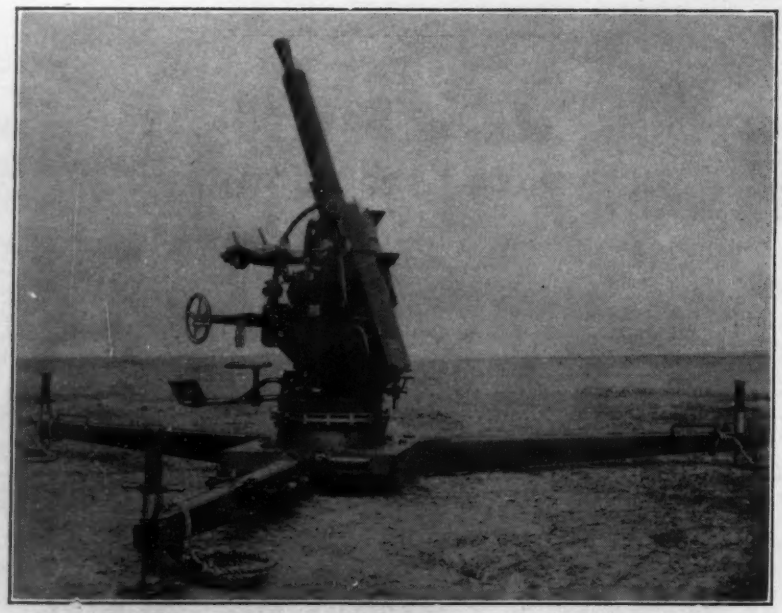

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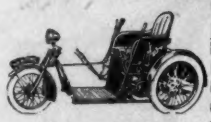

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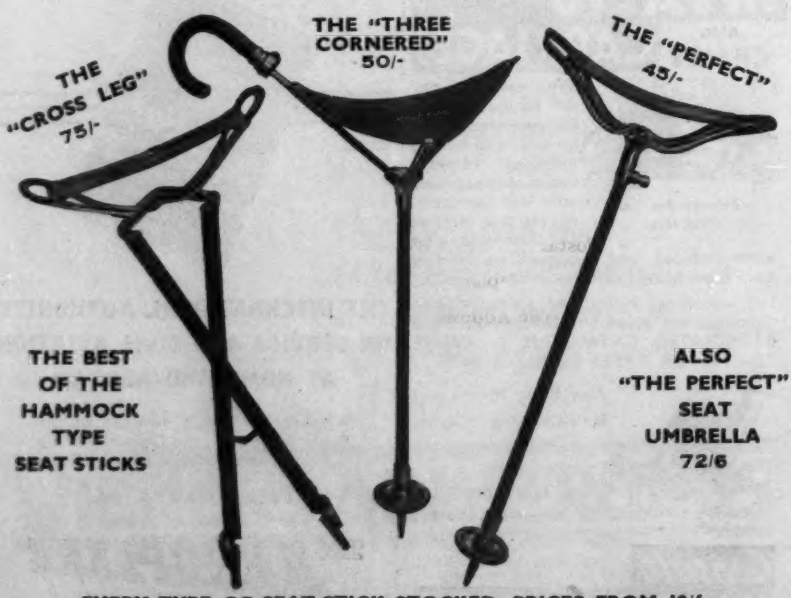

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The R.U.S.I. JOURNAL is published quarterly and sent post free to Members in any part of the world. Copies may be purchased by non-members, price 7s. 6d.

THE MUSEUM

Situated in the Banqueting Hall of the old Palace of Whitehall (1622), with its magnificent Rubens ceiling, the R.U.S. Museum is a treasure house of relics and mementoes of great victories and renowned warriors. There is also a most valuable collection of Uniforms, Medals, Ship, Tank, and Aircraft Models, and models of the battles of Trafalgar and Waterloo.

For Members and their friends, there are private entrances to the Museum from the Institution.

H.M. Forces in uniform are admitted free at the public entrance.

Admission to the general public is 1s.; Wednesday and Saturday after Noon, 6d.

SECRETARY'S NOTES

May, 1938.

Chairman of the Council

Air Vice-Marshal Sir Philip Game, G.C.V.O., G.B.E., K.C.B., K.C.M.G., D.S.O., has been elected Chairman of the Council for 1938–39.

Vice-Chairman of the Council

Admiral Sir William Goodenough, G.C.B., M.V.O., has been elected temporary Vice-Chairman of the Council for 1938–39.

Council

Rear-Admiral W. N. Custance has resigned from the Council on taking up an appointment abroad. Vice-Admiral Sir Geoffrey Blake, K.C.B., D.S.O., has been appointed to fill this vacancy.

Other changes in the Council will be found in the Report of the Anniversary Meeting.

Representative Member

Air Commodore R. P. Willock has been appointed by the Air Ministry as their Representative Member in succession to Air Vice-Marshal W. Sholto Douglas, M.C., D.F.C., *p.s.a.*

New Members

The following officers joined the Institution during the period 1st February to 15th April :—

ROYAL NAVY

Lieutenant-Commander R. J. Burch, R.N.
Lieutenant F. M. A. Torrens-Spence, R.N.
Commander Sir E. Lionel Fletcher, Kt., C.B.E., R.N.R.
Lieutenant E. K. U. Clark, M.V.O., R.N.
Lieutenant F. D. Brown, R.N.
Rear-Admiral C. R. Wason, C.M.G., C.I.E.
Lieutenant J. N. Congdon, Royal Marines.
Commander V. A. E. Hanning-Lee, D.S.O., O.B.E., R.N.
Lieutenant C. G. Cowley, R.N.
Commander F. W. Hawkridge, D.S.C., R.N.
Lieutenant A. J. F. Milne Home, R.N.

ARMY

Lieutenant J. A. H. Powell, The King's Royal Rifle Corps.
Lieutenant-Colonel C. A. Raynor, D.S.O., M.C., Indian Army (retired).
2nd Lieutenant St. J. M. Du Plat-Taylor, The Queen's Own Royal West Kent Regiment (S.R.).
Lieutenant H. B. Hudson, 15th Punjab Regiment, I.A.

Captain J. H. N. Poett, The Durham Light Infantry.
2nd Lieutenant J. M. Hewlett Sargent, Royal Tank Corps.
Major W. E. D. Wilkinson, R.I.A.S.C.
Captain T. F. J. Collins, The Green Howards.
Captain L. L. Gordon (T.A.), R.A.R.O.
2nd Lieutenant T. Marsham-Townshend, Scots Guards.
2nd Lieutenant A. F. L. Low, Royal Artillery.
Major G. L. Matthews, 9th (2nd City of London) Battn. The Royal Fusiliers.
Captain I. L. W. D. Laurie, Royal Tank Corps.
Captain W. H. Cadman, late 1/6th Manchester Regiment and Special Brigade R.E.
Captain J. R. D. Gilbert, The East Yorkshire Regiment.
Lieutenant J. G. Newman, The Northamptonshire Regiment.
Lieutenant D. G. Moore, The Royal Inniskilling Fusiliers.
Captain D. W. G. Ray, The Royal Fusiliers.
2nd Lieutenant W. D. Flower, 6th Battn. The Queens Royal Regiment.
Captain J. H. Beattie, Royal Artillery.
Lieutenant H. C. Slessor, Royal Horse Artillery.
Lieutenant H. G. M. Dunn, Royal Artillery.
2nd Lieutenant D. V. Bonsor, Grenadier Guards.
Major A. E. P. Bridge, 4th Battn. The Royal Sussex Regiment.
2nd Lieutenant W. G. S. Mills, The Royal Berkshire Regiment (S.R.O.).
Captain E. S. Jenkins, Royal Artillery.
Lieutenant A. H. T. Hogge, The Hampshire Regiment.
Captain C. H. Lyddon, Royal Corps of Signals.
Major R. Twisleton-Wykeham-Fiennes, The Royal Scots Greys.
Captain G. H. Cree, The West Yorkshire Regiment.
Captain G. des C. Chamier, K.O.Y.L.I.
Brigadier C. F. Liardet, C.B., D.S.O., T.D.
Captain Mohamed Ali Ahmed, Hyderabad State Forces.
Lieutenant-Colonel G. R. Turner, M.C., D.C.M., Royal Canadian Engineers.
Captain H. A. Forrest, late R.A. (T.).
Brigadier W. H. P. Elkins, C.B.E., D.S.O., Royal Canadian Artillery.
Lieutenant R. Eyton-Lloyd, The King's Shropshire Light Infantry.
Captain William Scott, D.S.O., M.C., Queen's University, Belfast, O.T.C.
Captain J. T. Feehally, R.A.S.C.
Lieutenant P. J. Howorth, Royal Artillery.
Major the Hon. the Master of Napier, 4th (The Border) Battn. K.O.S.B.
Lieutenant F. C. Hallowes, The Welch Regiment.
Lieutenant J. L. Harvey, Scots Guards (S.R.O.).
Lieutenant E. A. L. Iremonger, 3/14th Punjab Regiment, I.A.
Lieutenant W. H. B. Oldham, 4th P.W.O. Gurkha Rifles, I.A.
Captain L. Bolton, Royal Horse Artillery.
Lieutenant-Colonel A. S. Arnold, 26th (K.G.O.) Light Cavalry, I.A.
Captain D. R. Guinness, Royal Engineers.
Lieutenant D. St. L. Moore, Royal Artillery.
Major C. H. Price, 2nd Sikhs 12th Frontier Force Regiment, I.A
Captain J. M. Francis, The London Rifle Brigade.
Captain H. H. C. Sugden, R.E.
2nd Lieutenant D. R. Schofield, 10th (3rd City of London) Battn. The Royal Fusiliers.

Captain D. Campbell, R.A.
Lieutenant J. C. H. Shaw, late Royal Signals.
Captain C. G. V. Tryon, Grenadier Guards.
Lieutenant D. C. Merry, B.A., R.E.
Captain O. C. Johnston, The Royal Sussex Regiment.
Captain H. G. Cowdell, 4th Q.O. Hussars.
Major-General E. M. Steward, C.B., C.S.I., O.B.E., I.A.
Lieutenant V. K. Butt, The Dorsetshire Regiment.
2nd Lieutenant I. R. Nelson, I.A. (Unattached List.)
Captain R. A. G. Nicholson, R.A.

ROYAL AIR FORCE

Air Commodore R. P. Willock, R.A.F.
Flight-Lieutenant A. Green, R.A.F.
Flying Officer A. J. Mason, R.A.F.
Flight-Lieutenant D. R. Evans, R.A.F.
Flight-Lieutenant P. Beckett Wood, R.A.F.
Flying Officer R. D. Stubbs, R.A.F.

Suspension of Entrance Fee

As a temporary measure, and especially to enable as large a number of officers as possible to avail themselves of the facilities offered by the Institution during the period while His Majesty's Forces are being increased, the Entrance Fee has been suspended.

Officers of all ranks whose names appear on the current Official Lists can, therefore, join the Institution by paying the Annual Subscription of £1 5s. only. Membership will date from the 1st January.

Gold Medal Essay (Air), 1938

The following subject has been selected :—

" Discuss the influence which modern air forces may exert on British strategy in a major European War in which Great Britain is involved; and suggest what higher control organization is desirable in order to co-ordinate the operations of the three Services."

The following Essay has been received :—

" . . . The pestilence that walketh in darkness . . ."

Change of Address

Members are reminded that they are responsible for keeping the Secretary informed of any change of address. Non-receipt of the JOURNAL is almost invariably attributable to the fact that the Member has not notified his movements.

LIBRARY

Facilities for Borrowing Books

The special attention of Members who are paying the comprehensive annual subscription of £1 5s. 0d., is invited to the fact that they are thereby entitled to the full privileges of the Lending Library without further charge. These include the right to have sent to them not more than four volumes at a time on loan, the Member paying postage both ways.

Old Members who have not wished to conform to the new arrangement and who are still paying the original subscription of £1 1s. od., must pay an additional subscription of 10s. per annum in order to belong to the Lending Library.

All Members are, of course, free to use the Library when they visit the Institution.

Rules Governing Return of Books

The attention of Members is invited to the following Regulations governing the retention and return of books :—

(1) Certain books, for which there is a special demand, must not be retained longer than a fortnight after the date of receipt. A notice to this effect will be found in the book.

(2) In the United Kingdom.—Books must normally be returned within one month of the date of issue ; but the Librarian is authorized to make extensions of one month at a time on application by a Member, up to a maximum of three months from the date of issue, if the work is not required by another Member.

(3) Stations Abroad.—When books are sent to Members abroad the same rules apply as for the United Kingdom, except that " the date of receipt " is substituted for " the date of issue."

N.B.—IN VIEW OF THE INCREASING DEMAND FOR BOOKS FROM THE LENDING LIBRARY, IT IS ESSENTIAL IN THEIR OWN INTERESTS THAT MEMBERS SHOULD ADHERE STRICTLY TO THE RULES GOVERNING THE RETURN OF BOOKS. FAILURE TO DO SO CAUSES MUCH INCONVENIENCE AND INVOLVES THE INSTITUTION IN UNNECESSARY EXPENSE AND CLERICAL LABOUR.

JOURNAL

Date of Publication

In future the JOURNAL will be published on the 25th January, April, July and October, but the numbers will still be known respectively as the February, May, August and November issues.

Orders for Supply

Subscribers are recommended to place orders for supply of the JOURNAL direct with the Royal United Service Institution, thereby obviating delay in delivery. A suitable order form can be provided on request.

MUSEUM

Special Exhibition

A Special Exhibition depicting the " Mechanization and Modernization of the Navy " is being arranged for the summer holidays, and it is hoped will be on view by the 1st June.

Additions

(8978) Shoulder-belt plate and belt buckle, Royal Scots Fusiliers.—Presented by Major F. T. V. Dunne.

(8979) Hunting knife found on a Subadar Major in the Indian Mutiny, with which he is thought to have killed his Commanding Officer.—Presented by Lieut.-Colonel P. K. Betty.

(8980) Pistols used at the Battle of Waterloo by General Sir Thomas Picton.—Presented by H. H. Harrod.

(8981) Duelling pistols of Lord Hopetown.—Presented by Mrs. A. Hope.

(8982) Wesley Richards B. L. Carbine, 1874; carved wooden ladle taken in the Black Mountain Campaign, 1891; badge of the Hospitaux Militaires; shoulder-belt plate and shako badge of the 26th Regiment.—Presented by Brigadier-General Sir R. Colleton.

(8983) Oil painting of James I by an unknown artist.—Presented by Miss A. Key.

(8984) Model of a Hawker "Hurricane" single-seater fighter.—Presented by Hawker Aircraft.

(8985) Engraving of the Allied Staff, Crimean War.—Bequeathed.

(8986) Arab despatch case picked up on the battlefield of Omdurman.—Presented by Captain A. S. Davies.

(8987) Coloured print of the Review of Volunteers by Queen Victoria, June, 1860.—Presented by C. H. Cornwell.

Attendance

The amounts taken for admission during February and March were as follows:—

£75 4s. 6d. in February.
£76 12s. 6d. in March.

SUMMARY OF MILITARY UNIFORMS

As already announced, the Uniforms Committee are engaged in compiling a Summary of the Uniforms, Equipments, Standards, and Colours of each regiment of the British Army, from its raising up to date.

Members who have in their possession contemporary portraits of officers and men in regimental uniform, or unpublished letters and diaries which contain information on these matters, or who can supply information from their personal recollection, are invited to communicate with Captain Donald Anderson at the Institution.

INDIAN ARMY

In response to inquiries made through the India Office and Headquarters of the Army in India, reports have been received intimating that, with very few exceptions, all regiments and units of the Indian Army desire to be associated with this scheme.

MECHANIZATION IN NEW ZEALAND

See Article in this Journal

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[Authors alone are responsible for the contents of their respective Papers. All communications, except those for perusal by the Editor only, should be addressed to the Secretary, Royal United Service Institution.]

TACTICAL AND ADMINISTRATIVE LESSONS OF THE WAR IN ABYSSINIA

By Colonel Count Ruggeri Laderchi,
Italian Military Attaché in London.

On Wednesday, 16th February, 1938.

General Sir J. F. Noel Birch, G.B.E., K.C.B., K.C.M.G., in the Chair.

The Chairman, on introducing the Lecturer, emphasized that the lecture was of a purely military character.

LECTURE

THE subject which I have been asked to deal with is an extensive one, and would lend itself to much wider treatment than I could possibly undertake in the time at my disposal, so I will limit myself to the examination of some of the most characteristic and less well-known aspects of the Italo-Abyssinian conflict.

Geographical and Climatical Conditions

In embarking on this campaign, the Italian Army was faced with two enemies: the Abyssinian soldier—a good fighter, tenacious, courageous, used to hardships—who would be fighting on familiar ground and in a climate to which for generations his physique had become accustomed; and the unknown dangers of a distant African territory. It will be convenient if I take the latter first and outline briefly the geographical features and climatic conditions of the theatre of war.

The Ethiopian tableland is the most extensive area of high land in Africa and that which is most clearly defined by sea and valleys; it also

has the highest average elevation. Picture it as an immense rocky hoof of a uniform height of not less than two thousand meters, hollowed by large rivers. The highest points indicate how much higher the whole stretch of ground once was. This region, four times the size of Italy and as large as France and Germany together, is entirely devoid of any facilities for communication by modern transport, and absolutely lacking in resources or local establishments which could be used or transformed for the needs of even small columns of European soldiers, to say nothing of an expeditionary force the size of the Italian one. The climate is torrid in Eritrea, Aussa and Somalia. In other parts of the country men are exposed to the tropical sun by day and to cold winds by night, with sudden changes of temperature varying in twenty-four hours from 77° to 87°. Such was the field of operations for our army of 500,000 men, with its modern equipment and animated by a strong will to overcome all obstacles and to conquer all difficulties.

But those difficulties were not only local and had not only to be overcome by the army in the field. We have only to recall the distance of the scene of operations from Italy, the size of the force employed, the necessity for providing all supplies from home, the requirements for loading, unloading and the transport of men and material, to realize that there were other great difficulties to be met at the outset.

Organization

The organization by the Central Authorities showed initiative and a spirit of wide understanding. This was essential for it would not have been possible to have supplied each want as it arose: success was dependent on looking ahead and providing for every contingency, on foreseeing what would be the life of the soldiers, and on preparing not only for probable situations but also for unexpected developments and requirements. Certain significant figures will give you an idea of the extent of the work carried out by the Central Military Authorities, by the Headquarters of the Expeditionary Forces, and by the units of the various services. These few statistics will indicate better than pages of abstract assertions the exact value of the work accomplished.

The Eritrean and Somalian scenes of operation are respectively 2,500 and 4,250 miles distant from Naples—the principal port of embarkation in Italy for men and material. It takes nine days by sea from Naples to Massaua, and fifteen days from Naples to Mogadiscio.

At the culminating point of the campaign the Expeditionary Forces consisted of: 18,200 officers; 368,300 Italian soldiers; 108,300 native soldiers; with 14,600 machine guns; 1,800 guns and trench mortars; and 450 armoured cars. Animals, the greater part of which were shipped

from Italy and the rest bought in neighbouring countries, amounted to 102,600. Motor vehicles amounted to 19,000.

The Central Authorities had under consideration 4,000 applications from officers on active service and 17,000 from officers on the retired list to be enlisted in the Expeditionary Forces. This alone showed the keen military spirit of the nation. About 50,000 applications for voluntary enlistment were also received from non-commissioned officers and men, but only 15,000 of these were accepted, because the principle was adhered to that regular units should be sent to East Africa, being completed only where necessary with volunteers.

Ships from Italy to Africa made 665 voyages, and the material carried amounted to 976,300 tons. The latter included :—

Ordnance and Medical—

4,200,000 shells for artillery and trench mortars.
845,000,000 cartridges rifle and machine gun.
334,000 tons of petrol.
87,000 kilometers of telephone wire.
6,000 telephones.
1,600 wireless transmitters.
10,000 tons of medical supplies.
150 field ambulances.

Supplies—

62,300 tons of frozen meat.
20,400,000 tins of tinned meat.
4,780,000 bottles of mineral water.
44,000,000 lemons.

The Expeditionary Forces used :—

25,153,000 yards of various material for the manufacture of uniforms.
4,700,000 pairs of boots.
3,800,000 sandbags.
600,000 various tools for sappers.
23,000 tons of wood.

These figures, imposing by themselves, acquire an even greater significance when we remember the very short duration of the preparations and of the campaign itself, and also the difficulties of every kind which had to be overcome. Actually, the campaign was started and carried on for some time, with comparatively good facilities for loading, but with barely sufficient means for transport and very inadequate arrangements for unloading. The problem of transportation was, in fact, greatly influenced by the limitations of the ports for unloading :

nothing or practically nothing existed there beforehand; everything had to be created. The position of the ports did not meet the exceptional necessities of intensive work and establishment facilities were meagre.

The Massaua Base

At the beginning of 1935, the Port of Massaua—the overseas base of the Expeditionary Forces, was only capable of dealing with about two hundred tons of material daily, and it lacked all kinds of equipment. The hinterland was arid, desolate and devoid of everything necessary to Europeans. The tableland could only be reached by means of a mountain track which in the space of seventy-seven miles increased 2,500 meters in altitude. A single narrow-gauge railway ran trains four times a week, capable of drawing only thirty tons of material each journey.

On the tableland the climate was good. Water was to be found in sufficient quantities; but everything had to be made—roads, wells, huts, warehouses, telephone connections, hospitals. Materials had to be sent from Italy, whether wood or cement, medicine or sandbags, ammunition or petrol, it all had to be ordered at home and sent to Naples, then loaded on the ships, transported to Massaua, unloaded, catalogued and finally arranged and forwarded to the tableland.

In a few months, roads capable of withstanding the heaviest motor traffic were constructed from the sea to the old frontier; the railway was put in order, and the port of Massaua and its hinterland were rendered capable of unloading and forwarding up to 3,500 tons of material per day.

The Landing Place at Mogadiscio

At Mogadiscio not even a port existed; the means of approach being merely a pier running into the open sea and periodically swept by monsoons. Ships had to anchor and unload with great difficulty by means of rafts and small craft capable of dealing with only some ten tons per day. The situation was improved by providing an adequate number of tow-boats and boats of every kind. Other localities along the Somalia coast were also equipped for unloading ships.

Road making and works on shore were carried out by companies of Italian volunteer workmen under the direction of civil engineers and officers of the Engineer Corps. In a short time the number of these workmen reached 70,000—a veritable army operating immediately in rear of the fighting men.

Supplies

Once men and material were disembarked and conveyed to the base of departure, it was necessary to provide for the needs of several hundred thousand men operating at a distance of 400–500 kilometers from the naval bases on the Red Sea and Indian Ocean, on broken and impenetrable ground, practically lacking in water and resources of every kind. Furthermore, it was necessary to adapt the food rations to the necessities of both Italian and native troops and to climatic conditions. Owing to the latter, the difficulties of meat supplies to the army in the field were immense. In the case of Eritrea, the problem at first appeared to be quite insoluble owing to the scarcity of storehouses of adequate capacity and to the fact that, in view of the climate, the normal European means of transport could not be used to advantage. But this was overcome by sending hundreds of containers of a light type adapted to local requirements and hundreds of refrigerators for forwarding meat to the various units. Besides this, in order to make up for the lack of a durable refrigerating system, two ships specially equipped and each capable of storing about 3,000 tons of meat, were sent to the port of Massaua as stationary floating refrigerators. It was thus possible to maintain a store of 6,000 tons, which was sufficient to ensure a continual supply of meat to the troops.

The perfect functioning of the food supply service was one of the principal causes of the excellent state of health of the army and contributed greatly to its physical and moral efficiency.

Health of the Expeditionary Forces

It was principally due to the detailed organization of the sanitary services that the troops enjoyed such excellent health notwithstanding the climate, local diseases, discomforts and toil. It was the first time in history that such an imposing mass of white troops had been sent to fight in a tropical zone, the larger part of which had a torrid climate, and it was the first time in a colonial war that the number of losses through illness was greatly inferior to the number of men killed in action. The losses through illness, from 3rd October, 1935, to May, 1936, only amounted to 600: according to the experiences of previous colonial wars, the number of deaths from illness should have been more than 20,000. The results achieved by the medical organization in East Africa were certainly marvellous and were due to the assiduous, constant and altruistic work of the 2,500 doctors who cared for the health of the troops, having recourse to the most modern prophylactic and preventive methods.

In order that this humanitarian work, which was extended to the native population in the parts of the country successively occupied by the Italian troops, might achieve the excellent results obtained, an extensive medical organization was necessary. It would take too long to refer to it fully here, but the following figures give an adequate indication of its extent :—

30 bacteriological and radiological laboratories.
13 surgical ambulances.
15 X-ray ambulances.
11 ambulances for dental treatment.
4 central institutes for analysis.
12 disinfecting sections.
6 decontamination stations.
140 water sterilizers.
4 general storehouses for medical supplies.

Amongst the Italian troops there were :—

1,241 cases of malaria.
453 „ dysentery.
458 „ typhoid.
30 „ sunstroke.

There were no cases of beri-beri, scurvy, or cholera. According to the experiences of previous colonial wars we should have had approximately 200,000 cases of malaria, 80,000 of dysentery, and 50,000 of typhoid.[1]

I will not digress further on the logistical preparations of the campaign, although they deserve to be more closely examined. Each branch of the service had to solve its own general and particular problems, and solve them as quickly as it possibly could. Unforeseen obstacles of every kind called for a well-trained personnel to meet them with promptness, skill and practical ability. No definite scheme could be arranged in advance, but a far-seeing and realistic conception of the changing military situation was absolutely essential.

Character of the War

The campaign of the Royal Italian Army in East Africa is habitually considered as a " colonial war." I should like to point out, however, that it had only one analogy with other colonial wars, namely the

[1] This information has been taken from the publication, " Notes on the Medical Organization and Health of the Italian Troops during the Ethiopian War," by Sir Aldo Castellani, who has earned the gratitude of my country for his personal and experienced contribution in this highly humanitarian field.

distance of the theatre of operations from the Home Country. It differed notably in every other respect. Contrary to the usual procedure, this campaign was carried out by the Italian Army with an absolute preponderance of metropolitan troops, in formations of large units (divisions and army corps), armed and equipped as for European battlefields. Finally, the military operations were carried out by large and small units according to the instructions and precepts of our regulations concerning conflicts between European armies of similar organization.

At the end of the campaign, therefore, the Italian Army was able to gain considerable knowledge and test many dubious points concerning its military organization. Moreover, in consequence of this, the Army now has a large number of high commanders, officers and non-commissioned officers accustomed to the use of modern units on the battlefield. From a military point of view, this harvest of experience is of inestimable value, especially when we consider the difficulties of an efficient command in peace time, for the opportunities which officers of every rank have of using units with full establishments and equipment are extremely rare; also there is an almost total impossibility during ordinary manœuvres of estimating the reciprocal influences and interferences of the new means of warfare—such as mechanization, tanks, aviation, and wireless communications.

The mobilization of entire divisions for a colonial undertaking constituted, therefore, a measure of notable organic value, having a great influence on the spiritual cohesion of the unit and on the tactical training.

Preparations for the Campaign

The Infantry Division.—Seventeen Divisions took part in the Ethiopian War. Before embarking, each division underwent a period of instruction lasting two or three months, this instruction ending up with a series of continuous exercises comprising :—

(*a*) March towards the enemy—reconnaissance and security measures.
(*b*) Approach and battle line-up.
(*c*) Attack and exploitation of success.
(*d*) Pause and consolidation.

Before leaving for East Africa, all the units of the Army and of the Militia had reached a considerable degree of military efficiency and their morale was very high.

Organization of the Infantry Division.—From an organic point of view the various units maintained their normal framework, but reduced

the numbers provided for in the War Tables, in order to render the units more agile for the Eritrean zone of operations. These units fully responded to the various peculiarities of this colonial campaign.

Means of Transport

Infantry Division.—There were two different kinds of transport: pack transport for infantry weapons and divisional artillery; and mechanical transport, i.e. lorries, tractors, etc., for the auxiliary service units, engineers, communications, and other services.

In view of the mountainous country and the absolute lack of roads, the pack transport of arms and material gave excellent results, as was expected. During the Great War, the mule had proved its capabilities in the Alps, and so it did during the Abyssinian campaign. In spite of the climate and altitude, it followed the infantry everywhere, so that they had their arms always within reach. So much for the tactical field. In the strategic field, slowness of movement was avoided by loading the divisions and animals on columns of lorries.

Motor Transport of Animals.—The transportation of animals by motor became a normal procedure and gave excellent results. I will give you some examples:—

(*a*) The urgent transport of the animals of the 5th Division from the Senafè sector to the M. Fundinari sector, was carried out in under twenty-four hours.

(*b*) The entire complement of men, animals and material of the Assietta Division was transported from Massaua to Decamere, from Decamere to Macallè, by more than 800 motor vehicles in two separate relays, in respectively eighteen and twenty-two hours.

(*c*) The urgent motor transport of about 2,000 mules from the Senafè sector to Adua was carried out with about 350 motor vehicles in only fifteen hours, while at the same time more than 4,000 other mules were transported from Massaua to various advanced sectors.

Owing to the exceptional conditions under which motor vehicles were to be used, a thorough pre-selection of types was necessary. For Eritrea the appreciable reduction in engine power due to the altitude, the resistance of materials on rough and uneven ground where springs and transmission are subject to hard use, and the necessity of using both light and easily handled material, all had to be taken into account. For Somalia it was necessary to consider the effects of high tropical temperatures, unfavourable to the cooling of the engines, and the

uncertain and variable types of ground—sometimes sandy and often marshy (during the period of the rains) which prohibited transit.

In fact, the campaign in East Africa, the chief characteristic of which was movement with accelerated rythm, was for the mechanical units a very severe trial. The great complications caused by long distances and difficult ground are obvious ; anyone wishing to set a test for motor transport reaching the limit of possibility, certainly could not have found a more complex one than this. The transport was therefore an operative and life-giving element.

Transport of Troops.—The following are some significant examples of the transportation of troops :—

At the beginning of March, 1936, a special column, known as D.S., was assembled near Asmara. This was completely motorized. It moved off from Asmara on the 5th of that month, reached Om Ager on the 19th, crossed the Setit on the 20th, and travelled over 300 kilometres along a path never before used by vehicles. Abandoning the lorries during the last part of the journey on 1st April, the column occupied the historical city of Gondar.

On 7th April, Marshal Badoglio pointed out to the Army Service Corps the necessity of rapidly proceeding to the occupation of Addis Ababa, restricting the limit of time available for preparations, so as not to allow the enemy time to recover. This occupation was to be carried out by such elements as would serve to overcome decisively any further Ethiopian resistance along the 300 kilometers which separated Dessie from Addis Ababa. The column marching on Addis Ababa, departing from Dessie, comprised 10,000 national white troops, eleven batteries, and a battalion of light tanks. The organization for the movement of this column entailed the preparation of 1,785 motor vehicles, which had to reach Dessie at a given time in spite of the lack of roads, and the temporary provision of an adequate convoy of supplies and various material. All the best military motor vehicles had to be put at the disposal of the column, from the smaller motor cars, " model 32 " (some of which were carried on heavy lorries beyond Macallè to prevent previous wear and tear) to the excellent " Lancia, RO." The column arrived at Addis Ababa without damage, and created a new record in transportation.

The following are the more important lessons learnt with regard to motor transport. The types of motor lorries normally to be used for supply service can be reduced to three ; viz. :

(*a*) A special type of lorry capable of travelling at a limited speed along paths and cart tracks in the immediate vicinity

of the operating troops, but also able to carry out long journeys on normal roads without risk of excessive wear of the engine and transmission.

(*b*) A light motor lorry, preferably of medium capacity, of high speed and with sufficient engine power, able to carry at least thirty-eight hundredweight of material and a suitable number of troops along hilly and ordinary roads.

(*c*) A heavy lorry of high engine power and sufficient speed able to carry a load of at least ninety-five hundredweight of goods on long distances and to negotiate any kind of slope on narrow, winding roads.

The ordinary infantry division with pack artillery can be transported by lorry without any previous preparation so long as a sufficient number of motor vehicles, preferably of medium capacity, is available.

The most economical use of motor vehicles is to centralize them under the Army Corps, leaving only the lorries necessary for their internal use to the smaller units.

The organization of mechanical transport services requires much foresight, followed by serious and detailed preparation both in regard to personnel and material.

Having regard to what has already been said about animal and mechanical transport, we can make the following deductions :—

(*a*) Men can pass through and march on any kind of ground, even if roads are totally lacking.

(*b*) Animal transport can follow units operating on ground devoid of means of communication, though in rare and exceptional cases they require help from the troops when crossing difficult places.

(*c*) As the distance from the rear is sometimes too great, animal transport is not always able to ensure efficient supplies to the column.

(*d*) Even when paths and cart tracks are levelled and opened by a very large quantity of men, the work cannot proceed as quickly as the men and mules. No means of mechanical transport, whether tracked or otherwise, is capable of ensuring timely supplies to marching troops in mountain zones devoid of roads. But when paths and cart tracks have been opened up to motor traffic, it is possible in a short space of time to use normal lorries of a type capable of answering to the military requirements of an army equipped for mountain warfare.

It follows that, in the tactical field, manœuvring and the exploitation of success are always possible, in accordance with the capacity of the fighting units to march on broken ground ; but adequate supplies must be obtainable from the rear so as not to hamper manœuvre and pursuit. At the present time, the only satisfactory means of accomplishing this task is by the use of aircraft, either to drop provisions or to land with them.

Supplies by Air

During the campaign aircraft were extensively used for the transport of supplies. The most important occasions were :—

When an air formation whose principal base was the Assab Airport was exclusively used to transport supplies, and for the communications, exploration, etc., of a column operating in the Aussa region. Later on, emergency landing grounds were established so as to have other bases to keep up with the advancing column and also to allow the air force to carry out longer range war operations in the heart of the Ethiopian Empire.

When, immediately after the occupation of Gondar, during the whole of the period in which it was impossible to send supply caravans from Om Ager, our aviation dealt with supplies to the troops in Gondar by dropping provisions and later by landing.

When during the third week in March, the III Army Corps, while carrying out operations in the Alagi Passes and during the complete occupation of the Tembien, moved from the Fenaroa zone across the Samre and Tzellari fords towards Socota. The latter is an important caravan intersection from which communication is established with Tana and the Goggiam region. The operations of the III Army Corps were particularly difficult owing to the sandy condition of the ground in the Socota zone which absolutely prohibited motor transport and also rendered animal transport far from easy. The only possible way to remedy these conditions was the use of aeroplanes for supplies, which we did with excellent results.

It was indeed the use of an imposing mass of aircraft for supplies which permitted military operations to proceed so speedily and gave to the campaign the character of a war of movement.

Plans of Operation and Italian Military Doctrine

With regard to the actual military operations, I have no intention of compiling a chronicle of such recent events, as they are certainly known to you all. I propose, however, to state the plan of operation of the Italian High Command and then to trace the episodes which permitted

us, in seven months, to overcome all enemy resistance and to enter Addis Ababa, distant about 1,000 kilometres from our frontier. Our new military doctrine of attack and of audacity—but an audacity guided by foresight—was the basis of the clear and simple plan of operations for the Abyssinian war: "take the offensive from North to South, search out the enemy armies and defeat them with our united forces." Of all the material and moral assistance offered by this precept, the most important issue was surely that, owing to the formidable defence positions which the ground offered to the enemy, our advance to the South would in all probability meet the enemy, assembled in considerable masses, deceived by the strength of the said positions and under the illusion that they might be able to resist. Thus they would prefer resistance to a quick retreat, battle to guerilla warfare, and offer themselves as a target instead of retreating. *In this way, and in this way only, would the war be short and decisive.*

Once the moment for action arrived, our tactical plan, destined to develop our strategic plan, was not to give respite to the enemy until his forces were completely exhausted: continuity and intensity of action together with a skilful and constantly recurring movement of encircling and pressing in upon the enemy forces would enable us to reap all the fruits of battle.

All preparations for moving off having been made during the first part of February, the troops—assembled in five Army Corps (four Italian and one Native)—were ready for action. Thus, on 10th February after the first battle of the Tembien in which we had overcome the enemy offensive to the right of our lines, the first phase of the Tigrai manœuvre started—a manœuvre which, by means of three connecting and partly simultaneous battles (Enderta, second Tembien, and Scire) was to lead, in the space of three weeks, to the total annihilation of the enemy and to the subsequent collapse of the entire Ethiopian northern front.

In the field of military science, the battle of Enderta represents a notable example of a war of movement; in fact, it constitutes the first large-scale practical application of the new theories which, after the World War, arose, as a just reaction to the deprecated, slow and static trench warfare. If in the tactical field, this victory led to the destruction of Ras Mulughieta's army, in the strategic field it permitted an encircling movement from the South of the two Abyssinian armies of the Tembien—those of Ras Cassa and Ras Sejum, a manœuvre which culminated in the second battle of the Tembien. The third and last phase was to take place in the Scire with the destruction of Ras Immru's army which with a strength of 30,000 men, had attempted to envelop the right wing of the Italian lines on the northern front.

After completing the difficult clearing up operations of the vast and intricate battlefields, engineers and companies of workmen started on road construction in the newly occupied territories, and only seven days after the battle of the Scire our troops continued to advance along the entire front. From 31st March to 4th April the last great battle was fought against the army of the Negus—an army 60,000 strong which was assembled between Lake Ascianghi and Ouoram. The Abyssinian army's attack was vigorously repulsed by the Alpine Divisions; the enemy, following our counter attack, soon gave up the fight. Thus the last Abyssinian army was wiped out. The most direct route to the centre of Ethiopia was now completely open to our troops on the northern front. On 5th May, Marshal Badoglio entered Addis Ababa. On 9th May, after the battles of Gorrahai, Neghelli and the Ogaden, the troops from the South, led by Marshal Graziani, joined up with the troops from the northern front at Dire Daua. And so, in the brief space of seven months, the campaign was victoriously brought to an end.

In conclusion; the essential factors which contributed to so rapid and decisive a victory were: the will of the people, the energy of the Government, the strategic ability of the army leaders, a just proportion between objective and manner of attainment, careful technical preparation of all the units, and, above all, the great spirit of endurance of the men.

DISCUSSION.

CAPTAIN E. H. M. PARSONS asked whether any anxiety was felt about attacks on the lines of communication, and whether any protective measures were taken.

CAPTAIN D. ANDERSON asked whether any special methods were adopted to get roads made more speedily, and whether in the actual construction of roads anything new was learnt as the result of the campaign.

MR. E. G. MANDEVILLE ROE asked if there were any lesson to be learned from the campaign as to the relative value of horse as against mechanized cavalry?

SIR LIONEL FLETCHER asked if sniping rifles were used by the Italian Army, and if so what magnifying power the telescopes had?

THE LECTURER:

With regard to the first question, about protecting our lines of communication; we did take protective measures, for there were always dangers to be dealt with. During our operations we advanced very rapidly in unfriendly territory. This facilitated the attacks of bands of marauders and we had, in addition, to protect our lines from the military point of view. To do this, we utilized aeroplanes which warned us whether or not enemy columns were advancing, and also as to their intentions. With regard to the marauding bands, our lorry columns were always escorted by machine-gun battalions. Before particularly important columns were sent forward the ground was carefully explored.

I was asked about road-making methods: Italians are naturally very good at making roads, and they know how to work with their hands. Every peasant in the countryside knows how to construct a road up a hill or to his house: it is a natural thing with him. During the campaign we did not really use anything new; the men worked hard in the sun for hours and hours, opening up first a little path which was then made wider and wider. The new roads which are now being constructed in Abyssinia are good, and of course do not follow the lines of the roads laid down during the campaign, and which, under the pressure of urgency, just went up and down. No special methods of road-making were used during the campaign, only the labour of the men.

In regard to the question of horse versus mechanized cavalry, the Italian point of view is different from the English one, because the nature of Italian territory is quite different from yours. We have to fight in the mountains, and I do not think that mechanical vehicles, tanks, and so forth, are of much value on such ground. They are of use on some occasions, but not always; so we have to have both forms of cavalry; in fact we have cavalry regiments which have horses and light tanks together. It has been said that horses and light tanks cannot work together successfully. That is quite true in the case of the flat ground which you have in this country, because the tanks are able to go much faster than the horses; but in Italy there are places where the horse can go but a tank could not.

We did use sniping rifles in the Abyssinian campaign.

The customary votes of thanks to the Lecturer and Chairman were carried by acclamation.

IMPERIAL AIR ROUTES

By Lieut.-Colonel H. Burchall, D.S.O.

On Wednesday, 26th January, 1938, at 3 p.m.

Air Vice-Marshal Sir Philip W. Game, G.C.V.O., G.B.E., K.C.B., K.C.M.G., D.S.O., in the Chair.

The Chairman, on introducing the Lecturer, said that Colonel Burchall saw service in the Air Services during the War, especially in the Middle East; he undertook the first commercial survey of the Cairo-Karachi route to help to establish it, and he has since been very intimately connected with the establishment of Empire services generally.

LECTURE.

IN speaking to Members of the Royal United Service Institution, I start with the great advantage of not having to prove that the Empire Air Routes are desirable. That, I think, can be taken for granted. From a Service point of view, the advantages of rapid communications were appreciated in the Roman Empire. In 1776, Edward Gibbon, writing in *The Decline and Fall of the Roman Empire,* said: "The advantage of receiving the earliest intelligence, or of conveying their orders with celerity, induced the Emperors to establish throughout their extensive dominions the regular institution of posts." Later, the advantages for commercial ends, as distinct from those of Government and defence, were equally clearly appreciated. In 1829, the following words were used in a report of the Commissioners of Revenue: "The facility of frequent, punctual, and quick communication which the institution of the Post Office was calculated to secure, may be justly classed among the elements of profitable commerce. It is essential to the purpose of Government and subservient to all the ends of national policy." Probably very few will quarrel with that, and its implication that the establishment of a rapid system of communications must not be judged solely on the basis of whether it can be made to pay on an elementary commercial basis.

It was not until the World War, however, that aviation developed to a state in which it could be considered as a practical means of communication. Under the stimulus of war the aeroplane developed from a scientific marvel into a practical vehicle; albeit of a fragile nature, high cost, and of somewhat uncertain behaviour. Nevertheless the main secrets of controllable flight had been unravelled and it needed only continuous development of the aircraft themselves and the technique of flying them to bring aviation to the reliable means of transport we have to-day.

THE INCEPTION OF IMPERIAL AIRWAYS

The civil use of aviation was clearly foreseen in 1917. In May of that year, the Air Board appointed the Civil Aerial Transport Committee, under the chairmanship of Lord Northcliffe, to report on " the steps which should be taken " to develop " aviation for civil and commercial purposes from a domestic, Imperial and international standpoint." On 7th February of the following year, this Committee, in its report to the Air Council, stated that " among the most important of the national benefits to be hoped for from air transport services are increased facilities for friendly communication with foreign nations, and still more, the improvement in intercommunication between the wide and scattered countries which make up the British Empire." Two years later, the ways and means of establishing the Empire Air Routes themselves were first officially considered. An Advisory Committee on Civil Aviation reported on Imperial Air Routes as follows: " The Committee have given very careful consideration to the question, ' How best to organize Imperial air routes ' . . . the conclusions of the Committee may be summed up as follows: (1) that the air route from Egypt to India should be developed; (2) that the development should be by private enterprise backed by State assistance . . ."

But the years immediately following the War were difficult from many points of view, and Empire air services were not immediately started. In 1921, the Department of Civil Aviation prepared a memorandum on Civil Air Communications within the Empire, from which the following significant passage is extracted :—

" All history proves the close connection between progress, power and communication. Statesmen . . . have failed for lack of swifter information of the movements of their envoys . . . the fact that in the XVIIIth Century it took six weeks on the average for communications to pass between Great Britain and her American Colonies contributed beyond doubt to their separation from the Mother Country . . .

" The organization of air routes is not a simple task, it is not summed up in the building of aerodromes or in the provision of machines capable of a given performance. There are countless details connected with wireless communication, meteorological data, repair facilities, etc., which must all be in working order before the word ' route ' can be applied, and it is in attention to the proper working of these details that the success of the service must depend.

" No State has more to gain from air communication than the British Empire, and the problems connected with it should be solved on an Imperial basis."

Meanwhile a beginning was being made with the operation of short

distance services from Great Britain to the Continent, first by the Royal Air Force and then by private companies, but most important of all from the Imperial standpoint, the survey of the Empire air routes of the future was begun.

For some years the British companies operating air services to the Continent struggled along in the face of competition from heavily subsidized foreign companies and from time to time received financial aid from the State to keep them in being. By 1923, however, the position became so serious that the Government realized that unless aid were given to them on a scientific basis, British air transport would not survive, much less develop. At the end of 1923, the Government therefore instituted an investigation into the problems relating to British air transport to ensure that the foundations of this method of transport should be well and truly laid and that the subsequent building should stand secure. The conclusion was reached that to ensure that air transport in the British Empire should come into its own, it was essential that one company and one alone should be given aid from the State for the task of developing it and that this company should, moreover, retain commercial independence.

As a result of this decision Imperial Airways came into being in 1924 (by the amalgamation of the four then existing companies) as the chosen instrument of the State for the development of air transport on a commercial basis. In short, the company was formed not because of a *belief* in the possible efficacy of the amalgamation but as a result of bitter *experience* of the alternative. Since then practically all European and many other nations have taken a similar step as a result of similar experience. To ensure a measure of financial stability during its early years and so to permit development and steady progress, Imperial Airways was granted a subsidy from the State, on a diminishing scale, for putting into effect a programme approved by the Government. As the years have passed services not covered by the original agreement have been inaugurated and additional subsidy has been granted. The basic principle has, however, remained unchanged, and the subsidy agreements have always provided a commercial incentive to the company to make the services self-supporting at the earliest possible moment.

In its early years the company had to confine its operations to Europe because the aircraft of the day were still not suitable for employment on long-distance routes within the British Empire, except on a basis of adventure. It had therefore to develop first, air liners appropriate to the task, and secondly to prepare, in collaboration with various governments along the projected Empire routes, the necessary " ground organization " which would permit of the operation of the needed

services. The difficulties have been great, but step by step, the services have come into being, first to India and then to Africa, then to Australia and to the Far East and their introduction has been followed by extension and expansion.[1]

In some ways it is a pity that commercial aviation developed out of the world war as it grew up in an atmosphere of rivalry and suspicion. It was first established by the victor nations and naturally became associated with the preservation of the position that had been won by force of arms. It is not surprising, therefore, that there should have been some confusion of thought arising from the possible military use of commercial aircraft, and indeed, there is no doubt that some nations still regard their commercial aviation as a potential military reserve and that Germany rebuilt her air force (forbidden under the Peace Treaty) by means of a pseudo-commercial air development. Little wonder, therefore, that in the Old World commercial air services came to be regarded as signs of national prestige.

The legal status of air navigation has been argued with considerable warmth since flight was first achieved by the Wright Brothers in 1903. As far as Great Britain is concerned the first Aerial Navigation Act was passed in 1911 and received the Royal Assent in 1913. In 1919 the Convention relating to the Regulation of Aerial Navigation was signed by the Allies and may be regarded as the basis of international air law in regard to air transport. The fact that this Convention was an outcome of the War has militated against its universal acceptance. The all-important point established by the Air Convention is that every Power has complete and exclusive sovereignty over the air space above its territory. The operation therefore of air services to and across

[1] For convenience, I give below the dates of the establishment of the various Empire air services:—

27.12.26	Egypt-Basra.
30.3.29	England–Egypt (with train link between Basle and Genoa). Egypt–Basra service extended to Karachi (India).
30.12.29	London–Karachi service extended to Delhi.
28.2.31	England–Central Africa (Mwanza–Tanganyika Territory).
20.1.32	London–Mwanza service extended to Capetown.
1.7.33	London–Delhi service extended to Calcutta.
23.9.33	London–Calcutta service extended to Rangoon.
9.12.33	London–Rangoon service extended to Singapore.
8.12.34	London–Singapore service extended to Brisbane by Qantas Empire Airways.
29.2.36	Khartoum–Kano (Nigeria).
14.3.36	Penang–Hong Kong.
15.10.36	Khartoum–Kano service extended to Lagos.
16.6.37	Bermuda–New York.
13.10.37	Khartoum–Lagos service extended to Accra.

foreign territory is dependent upon the goodwill of the country to be traversed or upon the bargaining power that can be exercised.

As we already have a great network of air services in Europe and America and several long distance services operating half round the world, those not in close touch with developments are apt to lose sight of the difficulties that may have to be overcome in the establishment of long distance services and the somewhat precarious tenure they enjoy when they have been established. Incidentally, both in the United States and in Germany there is great scope for internal services without the need for negotiation with any other Power—a state of affairs not repeated elsewhere in the world and which in part explains their great networks. In South America also the United States appears not to have to face the same sort of demand for reciprocal rights, and the same jealousies, as are apt to arise in Europe and in services originating in Europe and operating to points beyond that continent.

In Europe, therefore, we seem to have, common to most nations :—

(*a*) A desire to operate air services so that they shall not appear to be less advanced than their neighbours ;

(*b*) A desire to operate a service to every country that operates a service into *their* territory : and

(*c*) A reluctance to allow another country to operate a service into or across their territory if for any reason (including cost) they are unable to operate a reciprocal service.
This last objection is sometimes suppressed if an adequate *quid pro quo* is obtainable.

ECONOMIC ASPECTS

I have shown that commercial aviation started under somewhat unfortunate auspices, having developed (*a*) immediately after the War ; (*b*) out of a new and powerful military weapon ; (*c*) under an international convention drawn up by the victor nations ; and, as a result, became an emblem of national prestige. In such circumstances, it is natural that the ordinary commercial importance of £ s. d. should have been overshadowed. It can be argued, and I think with considerable justification, that commercial aviation would be worth developing regardless of whether the user pays the full cost or not. Apart from the prestige point of view, and the " purpose of Government and all the ends of public policy," a facility which when wanted at all is badly needed, may be well worth maintaining. Few of us would willingly agree to the abolition of the Fire Brigade for the sake of saving on our rates, or the termination of the opportunity to send a letter to Australia for 1½d. for the sake of a small saving on the postage of a letter to Kensington. The

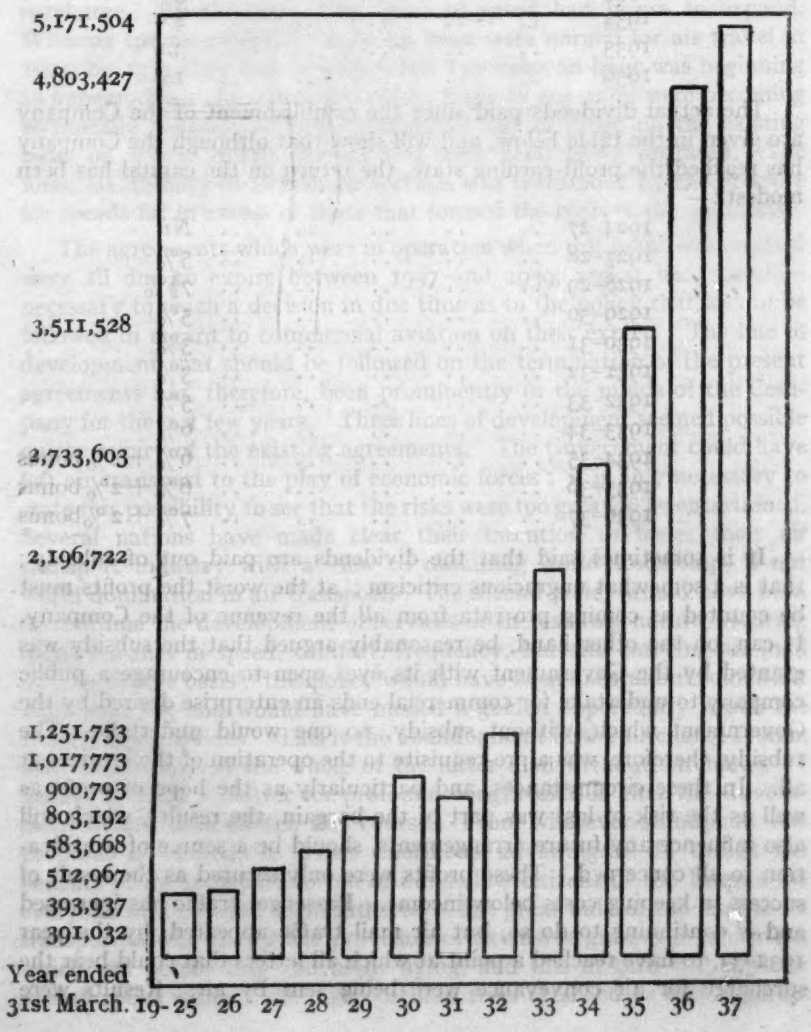
crux of the matter will, of course, be the value of the facility and the cost of providing it. In any case we always want as much as we can get for our money whether it be prestige, "the ends of public policy," or a personal facility occasionally required. Our Government probably having less need than other European countries for seeking empty prestige, and regarding commercial aviation as of little importance in our defence considerations, has always insisted on the policy of developing commercial aviation to a self-supporting basis at the earliest possible moment.

We have seen that in the early days of commercial aviation, the Government subsidized the operation of services to foreign countries, which involved journeys of not less than 225 miles and, because Great Britain is an island, involved also the crossing of water. By so doing the Government was getting the best value for the money it chose to spend on encourgaing commercial aviation. In due course services further afield were established as had been recommended in 1917. This recommendation has been confirmed by every official committee that has since reviewed the position.

Hitherto our Government has not subsidized internal services, as there are few routes of importance offering the same length of route as those to foreign countries, or a saving of time commensurate with the cost. Our internal routes do not offer the same opportunities for commercial exploitation as those in the United States or in Germany. Moreover, on the Continental routes the greater part of the journey does not compete with any other form of British transport, and on certain sections of the Empire routes air transport is the *only* direct form of transport available. There is, therefore, more to be said in favour of subsidizing these services rather than those that would be in direct competition with other British transport services. At present internal services in the United Kingdom in most cases offer little saving of time, are unlikely to develop a new class of traffic, and must therefore attract from surface transport some of the traffic they are capable of carrying by the services they already provide. The main arguments that justify the subsidy to overseas and Empire services do not, therefore, necessarily hold good for internal services except where they can show considerable savings of time.

The Government first contracted with Imperial Airways to operate certain services in Europe, and offered a privileged position for ten years and a decreasing subsidy for a given amount of flying. As each Empire service was opened, a new agreement was entered into. All agreements had this one feature in common—they provided payment on a descending scale for specified services and encouraged (or rather forced) the Company to aim continuously at making the services self-

supporting as early as possible. By the intensive use of large, multi-engined aircraft and the closest attention to operating technique, the economics of the various services improved, and from making heavy losses, the Company gradually, and in spite of decreasing subsidy, reached a paying basis and advanced a long way on the road towards financial independence. The increase in work done during these years is best shown by the diagram below, showing the ton miles of traffic carried each year since the formation of the Company :—



The advance along the road toward financial independence can be seen by the following table, showing the subsidy per ton mile of traffic carried from 1931 onwards :—

Year ended 31st March,	*s. d.*
1931	7·7
1932	7.6
1933	5.0
1934	4.0
1935	3.2
1936	1.9

The actual dividends paid since the establishment of the Company are given in the table below, and will show that although the Company has reached the profit-earning state, the return on the capital has been modest :—

1924–27	*Nil*
1927–28	5%
1928–29	7½%
1929–30	5%
1930–31	3%
1931–32	3%
1932–33	5%
1933–34	6%
1934–35	6% + 1% bonus
1935–36	6% + 2% bonus
1936–37	7% + 2 % bonus

It is sometimes said that the dividends are paid out of subsidy; that is a somewhat ungracious criticism: at the worst the profits must be counted as coming pro rata from *all* the revenue of the Company. It can, on the other hand, be reasonably argued that the subsidy was granted by the Government with its eyes open to encourage a public company to undertake for commercial ends an enterprise desired by the Government which, without subsidy, no one would undertake. The subsidy, therefore, was a pre-requisite to the operation of the services at all. In these circumstances, and particularly as the hope of profit as well as the risk of loss was part of the bargain, the results, which will also influence any future arrangements, should be a source of gratification to all concerned. These profits were only secured as the result of success in keeping costs below income. Passenger traffic has increased and is continuing to do so, but air mail traffic appeared, by the year 1932–33, to have reached a point at which all letters that could bear the surcharge for air conveyance were being sent by air. Results were

confirming the oft expressed belief of postal authorities that only about 10 per cent. of letters would bear a surcharge, however small, for accelerated delivery, whether by air or otherwise. There were some notable exceptions and Central Africa regularly despatched a greater proportion of its mail by air than this; but Central Africa was in a specially favoured position for the use of air mail, as the saving of time was exceptionally great. By 1933, therefore, the Company had begun to consider the practical possibility of the carriage of letter mail without surcharge. By this time, too, ideas of speed had begun to expand. Whereas speeds around 85 miles an hour were normal for air travel in 1924, by 1933 they had increased and 120 miles an hour was beginning to appear slow. Speeds of the order of 150 to 200 miles were becoming technically possible, although financially out of range on the existing basis on which British air services were then being operated. The financial stability of British air services was threatened by the pressure for speeds far in excess of those that formed the basis of the contracts.

The agreements which were in operation when this point was reached were all due to expire between 1937 and 1939, and it was therefore necessary to reach a decision in due time as to the policy that was to be followed in regard to commercial aviation on their expiry. The line of development that should be followed on the termination of the present agreements has, therefore, been prominently in the minds of the Company for the last few years. Three lines of development seemed possible on the expiry of the existing agreements. The Government could have left air transport to the play of economic forces: it is only necessary to state this possibility to see that the risks were too great to be entertained. Several nations have made clear their intention to foster their air transport industry with a view to obtaining world leadership, if not world domination in air transport. The second policy would have been to continue the development of services of the existing nature, securing improvements in speed, comfort, frequency, but still carrying air mail on a surcharge basis: this policy would have been natural but somewhat unprogressive, and would have missed a golden opportunity which the third policy provides. This is the abandonment of the surcharge system and the carriage of the whole of the letter mail without surcharge. I believe it to be a matter for profound congratulation that the Government should have chosen this course. From whatever standpoint this proposal is viewed, it shows enormous advantages. It brings the benefits of air transport to ten of our fellow citizens of the Empire for everyone that enjoyed them hitherto. The great bulk of the mail to be transported will justify the provision of extensive ground organization which will permit day and night flying, and this in turn will increase overall speed without the high cost and risks attached to very high air

speeds. The large number of services to be operated will give an increase in frequency that will be in effect as good as, or better than, an increase in flying speed. The size of aircraft can be increased, with attendant improvements in comfort and conveniences and the reduction of cost. Socially and culturally the improved communication will be of inestimable value. Finally, the improved cohesion of the Empire will bring a new era to its people.

EMPIRE AIR MAILS

The Company therefore approached the Government in 1933 with the revolutionary proposal which has now become known as the Empire Air Mail Scheme. As a result of the examination of this proposal, the Government in 1934, decided to recommend to the other Governments of the Empire that as soon as possible *all* first-class mail exchanged between countries in the Empire should go by air without surcharge and without the necessity for the sender to affix an air mail label or otherwise indicate that air transmission is intended. The adoption of this suggestion, would place the principal attribute of air transport—speed—within the reach of all the British peoples for the transmission of their mail and would thus be an immense step forward in Empire co-operation. When the programme was announced the Government stated that in order to carry the mail, four, or possibly five, services a week to India, in place of the existing two, would be operated ; three to Malaya and to East Africa, instead of the existing two ; and two each to South Africa and to Australia. These have already proved to be insufficient to cope with the loads. The time of transit would be progressively reduced to just over two days to India, instead of five as at present, two and a half to East Africa, instead of five, four to the Cape and to Singapore, instead of eight ; and seven to Australia, instead of the existing eleven and a half.

The first of the many steps which had to be taken to bring the plan into being was the building of the necessary aircraft. The whole scheme was dependent upon the economy that could be achieved by the intensive use of new and larger aircraft. Imperial Airways, from its inception, was the pioneer in the use of large aircraft. It was the first air transport company in the world to employ twin-engined, then three-engined and now four-engined air liners and the first to operate the big flying boat and the big land air liner. Many advantages accrue from the use of large aircraft ; for example, it is possible to provide a high standard of comfort with quiet cabins and also to provide a good catering service as well as to effect a big reduction in the operating cost per passenger mile or per ton mile. Furthermore, people who would not have been persuaded to travel by small and necessarily less comfortable aircraft have been converted to travel regularly by air by reason of the introduction

of large and comfortable air liners. The travelling public has in consequence come to look upon air transport as a normal means of locomotion and not as an adventure. Indeed it was the combination of decreasing operating costs and increasing traffic which brought the carriage of mail by air without surcharge within the realm of practical politics at the time when the Government in the United Kingdom was considering the lines of development to be followed after the termination of the existing agreements.

The programme was in part due to an investigation that was made into the economic aspect of the employment of larger aircraft than those which were then employed and to an inquiry into the benefits which would accrue from the employment of a much greater proportion of marine aircraft than had hitherto been used. Increase in the size of land aircraft presents difficulties with aerodromes, manœuvring on the ground and housing. On the other hand, with flying boats, every increase in size gives the flying boat greater seaworthiness. There is also no apparent limit to the size of flying boats as they are supported on the water by displacement and the difficulty of supporting a heavy weight on a wet aerodrome surface does not arise. In addition, a flying boat at its moorings automatically swings into the wind and can ride out a gale. For the same security a landplane needs to be housed. These facts were the key to the change over from land to marine aircraft to operate the greater part of the Empire services and in particular those operating over territory in which aerodrome construction presented serious difficulties.

It may now be taken for granted that with four-engined aircraft that can fly on the normal power of three of their engines no difference in risk is involved in flying land aircraft over water or flying boats over land, and the choice between land and marine aircraft is determined more by other considerations than by the nature of the land or water to be crossed. The use of flying boats does, however, present certain inconveniences ; in particular access from the shore to the flying boat requires the provision of a boat or some form of pier, raft or embarkation platform. The same difficulty does not arise in the use of land aircraft to which passengers may walk and vehicles may approach without hindrance. This, however, is a comparatively small matter. Again, generally speaking, flying boats are able to refuel at prices obtaining at the seaboard, thus effecting a great economy compared with the cost of refuelling at inland airports. The fact that petrol is used very largely for road transport which competes with railways may have had some influence on the rates for its carriage by rail, which so seriously increases the cost of fuel at places far inland from the coast. Its handling, in

addition, involves waste and expense in packing or in provision of special vehicles. At many points on the present Empire Air routes the cost of petrol is doubled by the cost of transport from the coast to inland airports.

It is not only those who are connected with it that see in the Empire Air Mail programme a development of great importance, and the following extract from the American Journal *Aviation* is perhaps worthy of quotation as a detached view :—

" For some ten years the American air transport industry has looked upon its British counterpart as something fine and conscientious. Recently, however, things have been stirring, but probably not quite as suddenly as it looks from over here. For years there has been talk about ' an Empire Air Mail plan.' Somehow though, none of us ever felt that all these things would ever come true at one and the same time. In all of its honourable history, Imperial Airways had never given anyone cause to suspect it capable of breaking out in a perfect rampage of progress. Yet that's just what it seems to be doing : 18-ton high-speed flying boats slipping off the assembly line like Taylor Cubs ; four-engined super-speed land transports ' almost ready for tests ' months before our corresponding D.C.4 project even promises to be off the drafting table ; real action toward a service across the Atlantic. New routes going in here, old ones to be torn up and moved there, schedules to be slashed, frequencies to double and redouble, night flying to start. Behind it all, a design to make the world's first real test of no-surcharge air transport of first-class mail.

" The more you sort it out, the more you realize that it all shapes up into a surprisingly unified and formidable plan. The more you study the plan, the more obvious becomes the promise to change the development of air transportation the world over. Call it long-nurtured strategy or a triumph of ' muddling through ' as you prefer, Imperial Airways' programme for the immediate future, if carried out as announced, can scarcely fail to give Great Britain a position in air transport equalling her leadership in ocean commerce. . . .

" Its equipment plans are really magnificent. Altogether there are some forty new planes already delivered, or expected during 1937. Of these, twenty-eight are 18-ton flying boats from the Short Brother's factory in Rochester. Powered with four Pegasus engines of 740 h.p. each, they will have accommodation for twenty-four passengers on day stages, sixteen on night journeys. They will have a crew of five, and capacity for big mail cargoes, at least on flights up to 1,000 miles. Their top speeds have been announced as 199½ miles per hour. Twelve of the ships on order will be four-engined Armstrong Whitworth Ensign land-planes equipped for twenty-seven day passengers and twenty at night.

The total horse-power of their four Tiger engines is 3,200. Their top speeds are to be ' somewhat over ' 200 miles per hour.

" What an astoundingly bold project this is ! How splendid, that in the midst of a frantic attempt to make up lost ground in the European race for European military air supremacy, the British Government has had the vision to authorize the diversion of manufacturing facilities for the construction of so great a commercial fleet. Incidentally, they are likewise permitting Imperial almost to double its flying staff in spite of the severe shortage of pilots for the Air Force. . . . It is inconceivable that such a process of space destruction could fail to have a tremendously beneficial effect upon Empire ties and loyalties.

" Even more stimulating is speculation upon the impact the success of such a project is bound to have upon the air transport systems of other nations."

RECENT AND FUTURE DEVELOPMENTS

In May, 1937, the thousandth departure from England on an Empire service was recorded. On 29th June, the Empire Air Mail programme was inaugurated by the departure from Southampton of a flying boat carrying unsurcharged letter mails for destinations on the route to South Africa. On 23rd February, 1938, the carriage of unsurcharged mail to India, Malaya, and the Straits Settlements is due to begin. The extension to Australia by our associated Company—Qantas Empire Airways—will follow as soon thereafter as the provision of ground facilities and the delivery of the necessary aircraft will permit, which we hope will be during the summer of this year.

There have already been delivered twenty-seven of the " C " class flying boats, and the first of the " E " class land aircraft flew on 24th January. The delivery of these aircraft will enable us to operate a through landplane service to India as well as the flying boat services. Branches from the main trunk route through Africa have already been established in Kenya, Tanganyika and Northern and Southern Rhodesia by companies in association with Imperial Airways. The possible extension of the main Australia trunk route to New Zealand has for some time been under consideration by the Governments of New Zealand, Australia and the United Kingdom. Hong Kong and West Africa already have feeder services from the main trunk routes, but these feeder services do not yet carry unsurcharged mail.

The extension of the British Empire services to include Canada is a problem on which much attention is being directed. To Australia and Africa stages of 500 miles can conveniently be arranged, and so secure reasonable economy. The extension to New Zealand involves an oversea

stage of 1,200 miles, and therefore greatly increases the cost per pound carried on this sector. The extension to Canada involves a still longer non-stop stage of approximately 2,000 miles, and in consequence the cost per pound carried will be out of all proportion to the cost of carriage on the other Empire services. It seems doubtful, therefore, whether the carriage of unsurcharged mail on this route can be expected during the next few years. Commercial aviation is making such giant strides, however, that before many more years have passed we may see not only trans-Atlantic aircraft carrying unsurcharged mail but the letter mail of the whole world, following the example set by Great Britain on the Empire services, being carried by air as the normal means of conveyance.

In bringing to the people of the world the benefits of aviation in the interests of peace, Great Britain and the Empire will be able to take a legitimate pride.

DISCUSSION.

CAPTAIN E. ALTHAM, R.N.: I have noticed in the newspapers recently a suggestion that the airship may come into the picture once again and that in Australia, more particularly, there is some enthusiasm for the idea of an airship service across the Pacific. I do not know whether I am asking the Lecturer to assume the role of prophet by inviting him to give his views on such a prospect, but it would be interesting to hear his opinion as to the future of the airship in connection with Imperial air communications.

THE LECTURER:

I do not like undertaking the role of prophet. There are, of course, certain advantages that the airship can claim, but its usefulness for commercial purposes appears to be restricted to long-distance routes, and on which intermediate stops are either impossible or unnecessary. There are probably only four or five such routes, i.e., the Atlantic, the Pacific, and England to South America. Airship routes might be practicable from England to India and Australia, and perhaps to South Africa, but on these routes there is much intermediate traffic to be carried. The airship has an inherent limitation in speed which heavier-than-air aircraft have not, and I suppose the question will ultimately turn upon which will give the balance of advantage in speed, frequency and low cost. Certainly between here and South Africa on the one hand, and Australia on the other, it is possible to have stages of about 500 miles for heavier-than-air aircraft, which can therefore carry the through load as well as pick up and set down loads at each point.

In the present state of development the aeroplane and flying boat can provide a service for Empire countries that the airship cannot do, but it must be admitted that the airship has performed trans-oceanic services outside the present scope of the heavier-than-air aircraft. Whether the increasing carrying capacity and speed of the heavier-than-air aircraft will in due course give to them a clear balance of advantages over the airship remains to be seen. Personally, I believe it will, except perhaps for a few special services.

THE CHAIRMAN.

The impression which this lecture has left with me is that we are very much inclined to take things for granted in these days. It was in 1908, I think, that I saw Mr. Paulhan going round the track at Brooklands about 100 ft. up in the air, and it was a marvellous performance; he flew ninety miles in a very small aeroplane. That is under thirty years ago, and now we have these wonderful flying boats and aeroplanes of which the Lecturer has told us to-day.

I suppose that nothing has affected our everyday life and our work and our thoughts more than the introduction of the internal combustion engine and the wireless valve, both of which have been developed within the last thirty years. But all this development of rapid communication is bound to lead to a certain danger of loss of initiative, of trying to 'hand over the baby' by wireless or other means to somebody else. Air services are a great corrective to that tendency because they enable us to get to know each other personally, and I look upon that as being even more important than the carriage of mails.

The customary votes of thanks to the Lecturer and Chairman were carried by acclamation.

THE FUTURE OF THE AIRSHIP IN IMPERIAL COMMUNICATIONS

By Lord Ventry,
Co-Editor of *The Airship*

IN the coming summer, the new Zeppelin, LZ.130, will take the air and set out across the Atlantic; this will be the first commercial rigid airship flight since the loss of the "Hindenburg" last year. Inflated with helium gas and driven by heavy oil engines, she will be practically fireproof. Her advent is bound to cause a revival of interest in airships, and may even make people in this country wonder whether we have been altogether right in giving up lighter-than-air craft and going in so wholeheartedly for flying boats.

On 28th June, 1920, that great apostle of the airship, the late Air Commodore E. M. Maitland, gave a lecture at the House of Commons on the future of airships, in the course of which he said: "I wish to make it quite clear at the outset that, commercially, the airship has not yet proved itself in this country. The reason for this is not far to seek, they have not yet been given their opportunity." That statement is, unfortunately, as true to-day as it was then. Meanwhile the Germans have undoubtedly made out the airship's case. Before the War, German rigid airships carried 37,250 passengers and covered 90,000 miles without a soul being hurt. These flights were, however, short distances from town to town. In 1919, the same company, known as the D.E.L.A.G., started up again and ran a regular service from Friedrichshafen to Berlin. Between August and December, 1919, one hundred and three flights were made, and 2,450 passengers were carried, again without a single casualty. The allies then stepped in and stopped it; why, nobody knows. On the one hand it was said that airships were "useless" in war, but the Germans were not allowed to build them; on the other hand they were permitted to build aeroplanes which were considered so much more dangerous.

Be that as it may, we now come to the "Graf Zeppelin" and the "Hindenburg," and the following figures are rather interesting. The "Graf Zeppelin" between 28th September, 1928, and 31st December, 1936, carried 35,421 passengers and covered 1,029,688 miles, flying for 150,391 hours. She made 139 ocean crossings during this period and, be it remembered, all these were flights to a schedule. The "Hindenburg" was only flying one season, but she flew for 2,787 hours, covered 190,455 miles, and carried 3,927 passengers, making 34 ocean crossings.

In short, these Zeppelins have proved that it is perfectly possible to run an airship service across the North and South Atlantic to a time-table published weeks beforehand, and they have also proved that passengers willingly go by this method of transport ; in fact, it was usually necessary to book a long time ahead.

What of the future ? The new LZ.130 is somewhat of a " make-shift " ; not having been designed for helium, she will not have so good a performance as the " Hindenburg." But her successor, the LZ.131, is designed for helium, and will therefore be more efficient. The modern airship has a maximum speed of some 83 miles and a cruising speed of 75 miles per hour, with a range of 8,700 miles, and a payload of 40,000 lbs. To do this, a horse-power of 4,400 is needed.

Compare these figures with the best present-day flying boat : this appears to have a range of 2,000 miles with a payload of 7,000 lbs., a maximum speed of 190 miles, and a cruising speed of 170 miles per hour. It seems fairly obvious that the airship is a long-distance vehicle, and the heavier-than-air craft one for short distances. It must be admitted that the heavier-than-air craft has the best of it as regards air speed. But is this everything ? When Air Commodore Maitland gave his lecture in 1920, he produced figures for airships which assumed an air speed of only 50 miles an hour. If we take this as a standard, it will allow for a headwind of 25 miles an hour, assuming that the airship is flying at the economical speed of 75 miles per hour. Here are his figures : England to Egypt would be flown non-stop, and the time taken by airship would be two and a quarter days ; Imperial Airways do it to-day in two days. England to India, with one stop of twelve hours would take five days by an airship, and is to-day covered by Imperial Airways in the same time. England to South Africa would require two stops of twelve hours each, and the airship would take six and a half days as against eight by aeroplane. England to Australia would take ten and a half days by airship, allowing for three landings of twelve hours each ; Imperial Airways takes eleven and a half days, but they go to Brisbane, instead of to Perth, which was the destination proposed by the Air Commodore for the airship.

Aeroplane services to-day, then, take as long or longer than those by airship would have in 1920. This is proved by the fact that an analysis of the flying boat flights of last year across the Atlantic shows an average of 89 hours for the journey from the West Coast of Ireland to New York, carrying an overload of fuel and no payload ; that is just 3 hours less than the " Queen Mary " between the same two points, and 45 hours longer than the airship. One reason for this is that the heavier-than-air craft cannot carry enough fuel to make non-stop flights like the airship,

nor can the flying-boat pilot fly by the weather map and so make use of favourable winds. The time taken from London to Montreal by a modern airship would not be more than two days, while with airships now under design in Germany and America this will be reduced to about 30 hours.

It is better, however, to stick to the performance of the airship of to-day, and the ten-year-old "Graf Zeppelin" can prove our point. Pan-American Airways' time-table shows that it takes more than 100 hours to get from Pernambuco to Miami by flying-boat. The "Graf Zeppelin," some years ago, made this trip, carrying twenty-five passengers and 5 tons of mail and freight, in 61 hours. In fact, the slower airship does a long-distance journey in a shorter time than the faster heavier-than-air craft.

Now let us consider, in turn, cost, safety, regularity, and comfort.

Cost of Bases

As far as cost is concerned, we in the British Empire are favourably situated, because a great deal of our overhead expenditure has already been carried out. For example, we have a large airship base at Cardington which will hold two airships of the latest type, with an up-to-date gas plant. We have also a shed and a mast in India, and a mast in Egypt. The mast in Montreal has recently been pulled down. The actual figures showing the cost of an airship base may be of interest. The base at Karachi, which consists of a large rigid shed, mooring mast, roads and other buildings and gas plant, cost £289,000. The mooring-out station in Egypt, which has only a gas plant and a high mooring mast, cost £78,000. The high mooring mast costs somewhere about £57,000, so did the mast at Cardington. It can be taken, then, that an airship base could be established for two airships for a cost of, in round figures, £500,000, while a mooring-out station with a high mast would cost about £80,000. It is debatable, however, whether the high mast will be required in future, and there are no figures available at present for the cost of a transporter tower; so we will assume that one costs the same as the other. If helium is used no gas plants will be needed, and gas storage will be cheaper than at present, so this will help to offset the extra cost of the gas.

Cost of Airships

We now come to the cost of the airships themselves. Naturally, if only one ship of a class has to be built, it is very much more expensive than several. The prototype of a ship round about six to seven million cubic feet would probably come to about £400,000, certainly not more. If put in production, the figure would probably come down to £300,000.

In this connection Dr. Eckener has stated that provided we construct a certain number of airships of a definite type, their cost will be one-third or one-half less than the present cost.

Running Costs

We now come to the question of running costs. Here we are undoubtedly treading on delicate ground, and I do not propose to go into details, for unless the figures are strictly accurate they are of very little value. On Dr. Eckener's own authority the "Graf Zeppelin," when only able to make ten round trips per year between Friedrichshafen and Rio de Janeiro and provided that she was completely booked, nearly covered her operating costs. The "Hindenburg," on the other hand, it is stated, did actually pay her way, and this without the heavy subsidies that aeroplanes invariably get. There is, of course, no greater authority on this subject than Dr. Eckener. Speaking in the United States, he gave the actual operating figures of the "Hindenburg's" ten North Atlantic flights in 1936—"Exact calculations," he said, "had disclosed the fact that airship operation over long distance is not only profitable but can easily be developed into a very highly profitable business. . . . If we figure on an airship sailing every five days each way, carrying forty passengers and only 2 tons of mail at 5d. per ½ ounce, the return on invested capital, after paying all expenses, works out at 7 per cent."

Since Dr. Eckener gave his figures, the "Hindenburg" is no more, and helium is to be substituted for hydrogen; this, of course, makes costing again difficult. To begin with, the present cost of helium, which may be assumed to be somewhere about £2 per thousand cubic feet, bears, it is believed, little relation to its final cost, for the more it is used, the cheaper it will become. Until this occurs, Dr. Eckener has stated that the operating costs will probably increase from 15 to 20 per cent. by using helium. This was some years ago, however, and already this estimated increase is falling. It can be definitely stated that much of the first cost of helium will be saved in the course of a year. For example, when hydrogen is used, and its purity falls below a certain figure, the airship must be deflated and the gas is entirely wasted, the ship being put out of commission for some time. With helium, on the other hand, the gas can be purified and used over again. With hydrogen, too, it may be assumed that in the course of two months, an airship uses up its own capacity of gas through diffusion and so on. During the War this occurred once a month. The helium figure, owing to the gas being denser, is far better, and it is safe to say that she only loses in a year approximately what a hydrogen ship loses in a couple of months.

As a result of experiments carried out chiefly by the Germans and the Americans, it is anticipated that very little gas will have to be valved when " ballasting up " at the end of the journey. This is a very important technical point, for when an airship has flown on a long trip, she obviously uses several tons of fuel. This means that when she is landing a corresponding amount of gas has to be valved, and this is wasted. Thanks to recent developments, however, it is possible to collect some 80 per cent. of this loss of weight, and it is believed that the remaining 20 per cent. will soon be accounted for. This means that very little or no gas will be valved at the end of the voyage, and so an immense amount of money will be saved. Helium is 8 per cent. heavier than hydrogen, and the lift of the airship is reduced by that percentage. Recent developments, however, allow this gas to be superheated above the temperature of the air at the start of a trip, and this gives the airship a false lift and so, to a certain extent, counteracts the extra weight of the gas. Another way to overcome this handicap is by lightening the structure of the airship. This will probably be possible in the near future as the Zeppelin Company have evolved a new metal which is stated to be some 7 per cent. lighter and just as strong as duraluminium. If this is the case and with other refinements, it should be possible to produce an airship of the same size as the " Hindenburg," for example, inflate her with helium, and yet give her the same lift as that airship had with hydrogen.

Safety

We now come to the vital question of safety. To begin with, a clear distinction must be made between commercial, Service, and experimental airships. If this is done, it would be found that only one commercial airship has been wrecked with loss of life, and that was the " Hindenburg." The following figures may be of interest in this connection: From 1909 to date some twenty commercial airships have been built, that is, airships built for carrying passengers. For ten of these we have the following figures: the total number of passengers carried by the ten airships is 302,405; 3,778,284 miles were flown, and 88,214 flights carried out. Unfortunately there are no figures for the other airships. Up to the loss of the " Hindenburg," not a single fare-paying passenger in a commercial airship had been killed, and few of them were even injured. Therefore about 108,000 miles have been flown for each death in commercial airships—a very fine record; all these ships were filled with hydrogen, and with the exception of the " Hindenburg," driven by petrol—the most dangerous combination. Active service flying is necessarily more hazardous, but apart from enemy action, the losses to airship personnel in all countries were extraordinarily small during the Great War. For example, our own naval airships flew during the War,

46,787 miles for each life lost, the total casualties being 48 killed and 239 injured in a Service, which at the end of the War numbered nearly 7,000.

Accidents to big airships in post-war years have, unfortunately, warped public opinion. The first of these was the R.38 which broke in two over the Humber in August, 1921, with the loss of Air-Commodore Maitland and forty-four others. This was due to the ship breaking in two because she was not strong enough. With modern knowledge this is never likely to happen again. The " Shenandoah," designed about the same time as the R.38, also broke in two, but, being a helium ship, with the exception of those in the control car, practically everybody escaped unhurt, for the two halves merely floated in the air and eventually landed like free balloons. The French lost the " Dixmude," a Zeppelin of the L.70 class, in the Mediterranean soon after the War; but this was due, too, to the ship being too light and probably also to a gallant but inexperienced crew getting into a bad thunderstorm. Our R.101 should never have started for India until further trials had taken place. The American airships " Akron " and " Macon " must not be forgotten either. The " Akron " was lost because she flew into the centre of a line squall over the Atlantic ocean, a mistake which might easily occur in the early days of air navigation. Owing to the circumstances of the crash at night in very bad weather, nearly all the crew were drowned. The " Macon " broke up in the air not long afterwards off the Pacific coast, came down slowly, floated on the water, with the result that only two out of eighty-three people were killed. Both these airships were inflated with helium, and so did not catch fire, but had petrol engines. The wreck of the " Shenandoah " proved for all time that the helium airship, even if it does break in the air and is forced to land, is no worse off that a ship sinking at sea, for in both cases the crews and passengers would normally escape injury. All these ships with the exception of the " Akron " were really lost owing to structural defects. As a result, intensive research has been proceeding, and far more is now known about the stresses and strains on an airship hull. The " Hindenburg " disaster was caused by an electric discharge igniting escaping hydrogen as the airship was about to land; yet more than half of those on board were saved. If an aeroplane had caught fire at a couple of hundred feet in the air, it would have crashed like a stone, and everybody would have been killed. With the use of helium and modern methods of design, such accidents as these should not recur. It may be said that bad weather may still be a possible cause for disaster, but as the modern airship carried some 75 per cent. reserve fuel, her captain, flying by the weather map, can avoid bad weather centres: there is no more reason why a properly-handled commercial airship should run into a dangerous weather condition, than an Atlantic liner should run into icebergs. The airship, like

the surface craft at sea, could also remain afloat with all her engines stopped. Modern aero-engines, of course, are very reliable and seldom break down; even if they do, repairs can be carried out in the air. With six independent engines and a mechanic watching over each of them throughout the whole flight, failure is practically impossible. Properly handled, heavy-oil airships filled with helium should be one of the safest forms of transport.

Regularity of Service

If a service is to be a commercial success, it must run to a time-table. The question is, are airships capable of this? The answer is that the Germans have done it for a number of years. Week after week, the "Graf Zeppelin" and "Hindenburg" started out either across the North or South Atlantic to a pre-determined time-table, and they always arrived punctually. Germany is lucky in that Friedrichshafen is practically windless: in the old days it was impossible to bring an airship out unless the wind was blowing up and down the shed. But, to-day, this is no longer an insuperable difficulty. A solution has been found in revolving sheds and/or mooring masts. The Germans are now building a revolving shed at Frankfurt and, although the cost will be high, it will no doubt pay in the long run.

There are two kinds of mooring masts, one is the so-called high mast on which the airship lands with a handling party of no more than twelve, and it is already possible to land airships of the largest kind with the wind up to nearly 35 miles an hour on such a mast. Then there is the transporter mast on which the ship can land, and then mast and ship are taken into the shed together. The combination of these methods is a telescopic mast which has been developed in the United States. The airship lands to a mast of moderate height which is then lowered. The handling guys are fixed to trolleys on rails, the bottom fin of the ship is attached to a stern beam and the airship can be handled in and out of the shed with about fifty men in almost any weather; if it is impossible owing to a side wind to walk her into the shed, she merely remains moored out to the mast. If the weather should be too bad to land, the airship can remain in the air in exactly the same way as a liner remains out in the Channel when it cannot get into Southampton. If she has arrangements for making contact with aeroplanes, passengers can be landed by that means, while mails can be dropped by parachute. Unlike aeroplanes, fog would not impede an airship service, and it would be possible for an airship to leave in a fog so thick that no liner could proceed.

Comfort

If the service is to be popular with passengers, comfort must be

provided. It is not honest to compare the passenger accommodation of an airship with a big Atlantic liner. We hear a lot about flying hotels and air liners in connection with heavier-than-air machines, but these titles are unwarranted. It is fairer to compare the modern passenger-carrying aeroplane or flying boat with a Pullman car, and the airship with a large and very comfortable private yacht. Normally speaking, a passenger would not remain in an airship more than three days on end; but during that time he will have plenty of space to stretch his legs, play games, play the piano, have proper meals, dance, and enjoy the privacy of a cabin and the privilege of a smoke. Added to this, the airship seldom flies very high. When flying from Friedrichshafen to London on one occasion, the "Graf Zeppelin" was rarely flying at a greater height than 700 feet which, as every air passenger knows, is a delightful height for observing the ground scenery. Therefore the monotony of flying is largely avoided. Again, the airship's passengers will not be deafened by the noise of the motors: even after a short flight in a heavier-than-air craft, passengers are often deaf as the result of the sudden changes of altitude and the noise of the engines. Sea-sickness and air-sickness are two of the greatest bugbears to would-be travellers. Travellers by liner may enjoy the sea when it is calm, but when it begins to blow, life becomes a misery; the same applies to aeroplanes: even the largest of them are far from blameless in this respect, and, after a trip to Paris, for example, in really rough weather, one is very glad to land. The airship passenger can be assured that there is no possibility of being air-sick.

Empire Services

We have tried to prove that the airship of to-day is quite fast enough to be considered, and that her costs are not unreasonable. We have shown, too, that thanks to modern research, the helium heavy-oil airship is at least as safe as any other form of transport, and that regular services can be run over the two Atlantics. Finally we have shown that the airship can give her passengers real comfort.

If an Empire airship service was to be organized, the obvious routes are between England and Canada, England and India, India and Australia, England and South Africa, South Africa and Australia, Australia and New Zealand. As most of these are in the tropics, airships will have to fly in great heat, and this will reduce the lift. If it were not for this, it would be possible for an airship of the "Hindenburg" type to fly from England to Karachi non-stop, or Karachi to Perth, while Capetown could nearly be reached non-stop from Cardington. But with this reduced lift, mooring-out stations will be necessary, and

these will give a modern airship the required lift, for less fuel will have to be carried.

The above-mentioned routes have all been surveyed and their meteorological conditions investigated, and so, provided airships and crews were available, it would be possible to organize services on such routes with the minimum of delay. Sheds for two ships and one high mast are already available at Cardington near Bedford, and a shed and mast for one ship at Karachi with a high mast at Ismailiah. A base with sheds would have to be built near Capetown and another in Australia and/or New Zealand, and one in Canada. Thus only five airship bases with sheds need be provided for the whole Empire, one of which—Cardington—is complete, and Karachi half complete, for another shed would probably be needed there. The mooring-out station at Ismailiah is more or less complete too. Other mooring-out stations would probably be provided at Bathurst (West Coast of Africa), Mombasa on the East Coast, Ceylon and probably in Australia or New Zealand if no sheds were erected in one of these countries.

Assuming each of these six bases (i.e., with two sheds each) cost £464,000 each (ignoring the fact that the two sheds at Cardington and one at Karachi are completed), the total sum required for airship bases would amount to £2,784,000, and there would be shed room for twelve of the largest airships. These would cost about £300,000, so the total sum would be in the region of £6,384,000, and for this sum the whole Empire would be linked by a fleet of fast modern airships, capable of paying their way without subsidies.

The Service Aspect

The naval point of view must not be forgotten, for the large helium-cum-heavy oil airship makes an ideal sea scout. In the event of war, the passenger accommodation would be taken out and five or six aeroplanes substituted; thus we should have an aircraft carrier and a light cruiser all in one.

An airship can do the scouting work of three light cruisers, and that at the cost of less than one. Assuming, therefore, that only half the twelve airships were in commission at any one time in a war, these would be equivalent to adding a force of eighteen light cruisers. The airships would be flown by experienced crews and would be of untold value for reconnaissance on the trade routes, while the majority of their bases would be quite out of reach of hostile attack.

Thus a well-considered programme of airship development would not only be valuable from a commercial point of view, but also from the Service standpoint.

SPEED AND GUN POWER IN WARSHIPS

A DISCUSSION

Initiated by CAPTAIN E. ALTHAM, C.B., R.N.

On Wednesday, 16th March, 1938.

ADMIRAL SIR CHARLES M. FORBES, K.C.B., D.S.O., in the Chair.

ADMIRAL SIR CHARLES FORBES said that Captain Altham would initiate the Discussion.

CAPTAIN E. ALTHAM, R.N.: I want to preface my remarks by saying that I am speaking as a Member and not as the Secretary of this Institution; also that any views I express are not based on any privileged information, nor do they profess to reflect in any way those of the Naval Staff.

In order to keep our Discussion within some well-defined limits, I suggest that we confine it to battleships, cruisers, and destroyers as being the three most important types of warships from the point of view of potential variations in speed and gun-power. But, at the outset, let me hasten to disarm criticism by saying that speed and gun-power cannot, of course, be regarded as the only ingredients claiming consideration. It was necessary to have a short title for the Discussion, but in practice other important factors such as armour, under-water protection, torpedo armament, radius of action (i.e., fuel stowage) and habitability have to be taken into account, and may have to be allotted a share of a limited displacement.

Before we start to discuss any details, however, I hope it will be generally agreed that all warship construction should be on the principle that "design must conform to function." I need only recall three examples to illustrate the fact that this principle has not always governed types of men-of-war even in our own fleet:—

Firstly there was the "King Edward VII" class battleships, which had such a mongrel main armament that effective fire control was almost impossible. No proper consideration had been given to the *purpose* of each of the many different calibres of guns with which they had been provided and how each was going to be used in conjunction with or quite separately from the other calibres.

Then there were the armoured cruisers of the " Defence " class which were sent to the Grand Fleet, where they were quite unsuitable as fleet cruisers and proved an embarrassment to the battle fleet and a menace to themselves at Jutland. They are, perhaps, more an example of ships, not necessarily of a bad design, being given wholly unsuitable functions.

Thirdly, there were submarines built to carry 12-in. guns. No use was ever found for them, although the idea and the design were both ingenious.

There is one other fundamental principle I should like to take as axiomatic before I get to closer grips with our subject: it is that the Navy's primary object in time of war is " to keep the sea routes open for our shipping and to deny them to that of the enemy." The most effective and economical way to achieve that object may well be to defeat the enemy's main fleet in battle. But the enemy may not offer battle, or it may be impossible to bring on a fleet action under conditions which will ensure it being fought to a finish. The defeat of the enemy's main fleet is a means of achieving that primary object; but to regard it as *being* the primary object—as it used to be regarded—is to put the cart before the horse.

Now I think we can tackle the material aspects of this problem, and in doing so we must, of course, take stock of the trend of design in foreign navies because, after all, the acid test of our own designs is that our ships shall be able to perform whatever functions they are required to perform in spite of what their opponents can do to try to stop them.

THE BATTLESHIP

All the indications of the late war, indeed of naval history as a whole, go to show that our enemies do not willingly accept battle with superior forces if it is possible to avoid it. As it is obviously our policy to maintain a battle fleet superior to any that is likely to be brought against it, we can fairly assume that a fleet action will only be brought about if our battle fleet can be so manœuvred as to make it impossible for our adversary to avoid it. That implies that our ships must be at least equal, but preferably superior in speed to any potential adversaries. Arguments to prove that tactics can be employed which would neutralize an enemy's superior speed, so far as fire effect is concerned, entirely ignore these fundamental strategical considerations: they assume that the enemy wishes to fight or has got to fight, whereas the chances are that neither will be the case.

In other words, if we build a battle fleet which is capable of killing the enemy but not of catching him, we shall in all probability never have the chance of using it in a fleet action.

Practically all first-class foreign naval Powers have built or are building new battleships with great gun-power, and, with the exception of the United States, of very much greater speed than any of our existing battleships. In fact, at present, we have nothing which can be regarded as a match for them except our three battle cruisers. Even such comparatively small ships as the German " Deutschlands " (10,000 tons) have guns which completely outclass our 10,000-ton 8-in. cruisers, and a speed which would enable them easily to elude any of our battleships. They have a great radius of action (fuel endurance), and the three of them could do untold damage on the Atlantic trade routes if they got loose. I think it is a mistake to assume that in a future war our enemy will necessarily keep his battleships securely in harbour and out of harm's way until he thinks he can catch part of our fleet unawares, as the Germans hoped to do in the late war. These new fast ships with their great sea-keeping capabilities are far more likely to emulate the success of our battle cruisers at the Falklands by mopping up any less powerful warships defending our shipping in the open seas. But it will be that shipping and certainly not our battle fleet which will be the first objective of an enemy's naval forces. It is true that to get at our shipping he may have to run the gauntlet of our battle fleet ; but, there again, if he has superior speed it will give him an excellent chance of avoiding being brought to action.

It follows, therefore, that speed, equal or superior to their potential antagonists', is a *sine qua non* for our future battleships. Let us glance at the table of foreign battleships, and see what sort of figures we have to compete with.

NEW FOREIGN BATTLESHIP TYPES

Country	Displacement Tons	Speed in Kts.	Main Armament	Secondary Armament	Armour Belt	Armour Hor'l	Armour Turrets
United States	*35,000*	*26 to 27*	*Nine 16-in.*	*Sixteen 5-in.*	*16-in. amidships*	*Up.Dk. 6-in. Lr.Dk. 4-in.*	?
France ..	35,000	*30*	*Eight* 15-in.	*Fifteen 6-in.*	*9 to 16 in.*	*8-in.*	?
	26,500	*31.5*	Eight 13-in.	Sixteen 5.1 in.	*7 to 11-in.*	*Up.Dk. 5-in. Lr.Dk. 2-in.*	*14 in.*
Italy ..	35,000	*30 (or more)*	*Nine 15-in.*	*Twelve 6-in.*	*9 to 10-in.*	?	?
Germany ..	35,000	*30*	Eight 15-in.	Twelve 5.9-in.	?	?	?
	26,000	*30*	Nine 11-in.	Twelve 5.9-in.	*8 to 10-in.*	*6-in.*	*12-in*
	10,000	26	Six 11-in.	Eight 5.9-in.	*4-in.*	*1½ to 3-in.*	*7-in.*

Note.—In the above Table, figures in italics are from unofficial sources, mostly *Jane's Fighting Ships, 1937* ; the remainder are from the official *Return of Fleets* of February, 1938.

We see that with the exception of the United States, who have obviously sacrificed speed for the larger calibre main armament, and Japan, which is still an unknown quantity, 30 knots or so seems to be the fashionable speed for foreign battleships. But abroad it is the usual practice to run trials light, and the fact that a ship is reported as having done 31.5 knots on the measured mile does not necessarily mean that she will be able to do so again under battle conditions. Nevertheless, in my view, our battleships should be good for 32 knots, fully loaded; this should give them 2 to 3 knots superiority of speed over any enemy ships of the class under similar conditions.

Yet if speed is absolutely essential to enable the British battle fleet to be reasonably certain of forcing action, there are, as we have seen, other vital ingredients in the make-up of a capital ship. The experience of Jutland must have taught us the unwisdom of building ships of great speed with a powerful armament, but which cannot take punishment. Even Lord Fisher overlooked the fact that to use her guns effectively a ship will usually have to approach within range of those of her adversary. To-day, moreover, she must be able to withstand being hit over the head and below the belt as well as in what used to be regarded as the more orthodox places. The long-range gun with its plunging armour-piercing shell and delay-action fuse, and the aircraft bomb make horizontal armour quite as important as side armour; while the long-range torpedo and the mine demand under-water bulging and sub-divisions—all of which eat an appreciable percentage out of total displacement.

But, it will be said, surely the most important thing of all in a battleship is her main armament for, after all, what is she but a platform for big guns; yet you are whittling away the available tonnage and leaving less and less of it for offensive purposes. I suggest, however, that in attempting to solve this problem we should continually bear in mind her *functions*, the chief of which is to be able to sink an opponent of a similar class: we have seen that our battleship cannot hope to do that unless she has the speed to force her adversary to fight and the protection to withstand knocks while she is making her gun-fire felt. If, in order to secure those indispensable qualities something has to be sacrificed in the weight of main armament, does it matter so very greatly?

Fire Effect

After all, what we are after is "fire effect." That does not necessarily imply the largest possible size of gun and the greatest possible weight of individual shell; it is the number of shell which *hit the enemy ship within a given time* and the damage they do by penetrating and

bursting inside her which is the real measure of our battleship's value. The chances of one or more shots of a salvo hitting are improved if we increase the number of guns fired in a salvo ; this alone is an argument for having more and smaller, rather than fewer and greater, guns for a given total weight of ordnance. Again, increased rate of fire should mean improved rate of hitting ; and the lighter gun can, presumably, be loaded and laid rather more quickly than the heavier one : those are other points in its favour. There are, of course, limitations to this line of argument ; for instance, the shell must not be so light that although it hits it will do no serious damage. In fact, the calibre of the main armament of our battleships must bear a relation to the armour of their potential targets.

A Proposed Type

Clearly it is not possible to go into exact figures without an infinity of data which, even if they were available, might not be in the public interests to quote. But having enunciated these principles, I will present them in some more tangible form by putting up as a " cock-shy " a battleship with the following main characteristics :—

Speed	..	32 knots.
Guns	..	Nine or ten 14-in. ; twelve 5.5 in. general purposes.
Armour	..	Deck and side to keep out 16-in. A.P. shell fired at a range of 20,000 yards or more.

I assume she will displace the standard 35,000 tons, that she will be bulged and sub-divided in accordance with the very latest developments in naval construction ; that she will have a radius of action of 10,000 miles at economic speed ; that she will carry two reconnaissance aircraft ; that she will be up to the usual standard of comfort and habitability of H.M. ships of the present day ; that she will not be overloaded with technical appliances which " might come in useful," but that they will be severely limited to essentials. Lastly, following the fashion in foreign capital ships, she will carry no torpedo tubes.

One more word before I take leave of " battleship " design : the introduction of a new class, such as I have visualized, necessarily means that, for a time, our battle fleet will be composed of some or all of the existing older and slower ships and also of newer and faster ones. This calls for renewed attention to the problem of the tactical employment of a fast squadron.

Cruisers

I do seriously suggest that the time has come to standardize our cruiser designs. No doubt they have suffered from the legislation of

the Washington and first London Treaties, and from the "economy crisis"; but, whatever the cause, the result is that to-day we have such a strange variety of classes that it would seem to be a case of "you pays your money and you makes your choice."

There are two main functions which the cruiser has to perform: (1) the protection of shipping, and (2) reconnaissance for the battle fleet. Do these necessitate different classes; if so, what should be their characteristics?

The Ocean Escort Cruiser

Protection of shipping being the Navy's primary duty, I will take that cruiser problem first. Bearing in mind our principle that design must be related to function, let us consider what are those forms of attack on shipping which will necessitate the antidote of the cruiser. Clearly, if an enemy should let loose some of these new fast capital ships like big bad wolves to devour our pig-meat and other vital commodities in mid-ocean, any cruiser they may encounter will merely be an additional tit-bit. The only answer to such a capital ship raider, once she is through our shore-based aircraft and blockading-submarine defences, would be ship-borne aircraft and/or cruisers with a good margin of speed to find her, and then a bigger and better capital ship, or a couple of equally powerful capital ships, to head her off and make sure of sinking her.

The next most formidable class of potential commerce raider is the 10,000-ton 8-in. gun cruiser. Although the type is now out of bounds for subscribers to the Second London Naval Treaty, yet all the principal Sea Powers already possess such ships.[1] It is, of course, possible that they would be kept with their main fleet and this must be taken into account when we come to consider fleet-cruiser types; but the first and most obvious answer to them is to maintain our own 8-in. cruisers in being.

It is our future policy in cruiser construction, however, rather than the merits or demerits of our many and various cruiser types which we are discussing. For that purpose we must assume that, apart from the

[1] The following is the position as regards 8-in. gun cruisers:—

British Commonwealth	15 ships	(5 reconditioned, 2 in hand for reconditioning).
United States	17 „	(and 1 completing).
Japan	12 „	
France	7 „	
Italy	7 „	
Germany	3 „	(building).
Soviet Union	Nil	

foregoing, our shipping may be attacked by enemy ships of approximately the 8,000-ton 6-in. gun class, lightly armoured and having a speed of well over 30 knots. Let us glance at the following details of typical foreign cruisers of this type :—

NEW FOREIGN CRUISER TYPES

Nation	Class	Displacement Tons	Speed in Kts.	Armament	Armour
France	"De Grasse"	*8,000*	*34*	*Twelve* 6-in. *Eight 3.5 in. A.A.*	*3 to 4-in. belt* *2½-in. deck* *5½-in. faces to turrets*
Germany	"Nürnberg"	*6,000*	*32*	*Nine 5.9-in.* *Eight 3.5 A.A.*	*2-in. turrets* *3 to 4-in. belt*
Italy	"Garibaldi"	7,874 *(9,000 full load)*	35	Ten 6-in. Eight 3.9 in. A.A.	*1½ to 3-in. belt* *1½-in. deck* *1-in. turrets*
Japan	"Mogami"	8,500 *(probably nearly 10,000 full load)*	33	Fifteen 6.1 in. Eight 5-in. A.A.	*2-in. deck*

Note.—In the above Table, figures in italics are from unofficial sources, mostly *Jane's Fighting Ships, 1937* ; the remainder are from the official *Return of Fleets* of February, 1938.

In addition to those enumerated in this Table, there is also the 10,000-ton cruiser type of the United States, "Brooklyn" and "Phœnix" classes, carrying fifteen 6-in. guns and eight 5-in. ; these are probably intended to be counterparts to the Japanese "Mogamis" ; but unless the escalator clause is invoked, they cannot be repeated.

The broad issue is—are we to build similar ships : fast, lightly armoured, and carrying as many 6-in. guns as we can put into them on an 8,000-ton displacement, i.e., slightly smaller "Southamptons," or ought we to build a different type ? The answer must depend on how we are going to use our cruisers to protect shipping.

It is pretty generally accepted that patrolling the sea routes is not a practical or effective way of protecting sea-borne commerce. It is the merchant ships on those routes, not the routes themselves, which we have to defend ; and there can be no doubt that in order to do so with the greatest economy of force, vessels must sail in convoys. Now if a convoy is attacked, it is the duty of the cruiser escort to stay by it and protect it ; it is not their business to go chasing after an enemy, leaving the convoy to the chance of being mopped up by another raider. I know the case of the "Emden" can be quoted against me ; but there were no aircraft capable of operating against that ship, and the whole circumstances were different to what they would be to-day. Normally, I suggest, for an escort cruiser gun power and armour are far more important than very high speed, because the bait of the convoy will bring

the enemy to us instead of our having to hunt him down. In short, I would plump for a ship of 8,000 tons, armed with fifteen 6-in. guns and sufficiently well armoured to keep out 6-in. A.P. shell at ranges outside 15,000 yards ; she should carry four aeroplanes ; and I would be content with 25 knots. Manœuvring in a smaller circle (round her convoy) she would be more than a match for any enemy raider, other than an 8-in. cruiser, and probably a very adequate opponent even for the latter. It is true that she could never hope to catch a 30-knot ship in a fair chase, and the latter might remain at large ; but, if the enemy came within range to attack the convoy, our better armed and more heavily armoured ship should be able to cripple the enemy's speed and then fall on him and destroy him. Our four aircraft might also be of material assistance in bringing about that desirable end, as well as being valuable for reconnaissance work. In suggesting this type of ship, I am assuming that she will not be called upon to fill a dual role. Obviously she is quite unsuitable to act as a fleet cruiser with a 30-knot battle fleet.

The Fleet Cruiser

There used to be an idea that the battle fleet must be accompanied by cruisers of a sufficiently powerful type to drive in the enemy's outposts, as it were, until they could sight his battle fleet and report its movements. In military parlance this is an abnormal form of reconnaissance, i.e., reconnaissance in force : normally the principle of conducting a reconnaissance is that it is carried out on the principle of scouting—i.e., a small unit works its way into a position where it can see, while avoiding contact with, the enemy. On shore this is achieved largely by taking advantage of cover, but also by mobility ; at sea it must be achieved essentially by mobility—i.e., by speed. It will be remembered that some of the most useful cruiser work performed at Jutland was done by our light cruisers. The battle cruisers, instead of fulfilling their expected role of driving in weaker outposts, actually became engaged in a capital-ship " dog fight " with ships of their own class. The next smaller type of super-cruiser, such as the " Defence " class, proved quite useless for such fleet work ; as already mentioned, they were simply an embarrassment to the battle fleet and a menace to themselves.

It is the special business of the fleet cruiser to be the " Admiral's eyes " should his aircraft fail him, also to intercept enemy torpedo craft before they can attack our battle fleet. If, while fulfilling these functions, they can avoid " dog-fights " with ships of their own or bigger types, so much the better.

The essential requirements for these two duties are, therefore, ships of very high speed, and lots of them ; in fact, they must be fast enough to dodge the enemy fleet cruisers, and both fast and numerous enough to waylay or hunt down his destroyers. This brings me to what I call my " fleet gunboat," which, I suggest, is the solution to the fleet-cruiser problem and part of the destroyer problem.

THE FLEET GUNBOAT

At present we have a class of ship with a composite armament of guns and torpedoes, no armour, and a fair turn of speed, which we call a destroyer. Destroyer flotillas are expected to perform any one of the following duties :—

(*a*) Anti-submarine screen.
(*b*) Anti-destroyer force.
(*c*) Anti-aircraft force (especially against torpedo carrying aircraft).
(*d*) Torpedo-attack force (against enemy battle fleet, by day or by night).
(*e*) Night reconnaissance or a night shadowing force.

Of these functions, three, i.e., anti-submarine, anti-destroyer and anti-aircraft work, essentially call for a gun, and not a torpedo, armament. If the latter were dispensed with, appreciable weight would be saved which could be devoted to increased horse-power and higher speed.

The modern destroyer is already approaching the status of a light cruiser ; for example, the fire effect of the eight 4.7-in. guns of the " Tribal " class destroyers would compare favourably with the five 6-in. of the old " C " class cruisers. For the cost of an " Amphion," let us say, we could have three " Tribals " ; these, with their 36 knots speed (as compared with the 32.5 knots of the " Amphions ") would, I suggest, be better value for fleet-cruiser work, quite apart from the three so-called destroyer functions already mentioned. In fact, with a 32-knot battle fleet, a fleet cruiser of only the same speed will be a complete anachronism.

But I do not regard the " Tribals " as by any means ideal. They are still a compromise, designed to perform a number of different duties which, as we have seen, really require quite distinct types. I advocate a rather bigger, more powerfully armed, and much faster design, which, in an article published in the JOURNAL in 1936, I called a Fleet Gunboat. She would be rather on the lines of the French " Mogador " class [1] ; except that she would shed the ten 21.7-in.

[1] These ships on a standard displacement of just under 3,000 tons carry eight 5.5-in. and four 1.5-in. A.A. guns, and ten 21.7-in. tubes. Their designed full speed is 38 knots.

torpedo tubes of those ships and put the saving in weight into increased horse-power. I visualize a ship of about 3,500 tons (full load), with an armament of eight 5.5-in. general-purposes guns and a speed of at least 40 knots. If without detriment to those main features she could carry a pair of 18-in. tubes (essentially for crippling an opponent and leaving her to be finished off by gun-fire) they might be added.

These fleet gunboats would be capable of performing all the essential functions of a fleet cruiser and three of those at present allotted to destroyers, but for which the latter are not really well designed.

THE FLEET TORPEDO-BOAT

There remain the other two destroyer functions: (*d*) torpedo attack of the enemy battle fleet by day or night; and (*e*) night reconnaissance—or a night shadowing force. For these, speed—the very highest speed obtainable with a powerful torpedo armament, are the main essentials. A small gun armament for self-defence—particularly against aeroplane attack, is also necessary.

I visualize a Fleet Torpedo-Boat type with a speed of at least 45 knots and carrying eight 21-in. tubes; also a gun armament of two, or at most four, 4.7-in. general-purposes guns, and a couple of multiple pom-poms.

PROPOSED BRITISH TYPES

Class	Speed in Kts.	Armament	Armour	Assumed Displacement
Battleship	32	Nine or Ten 14-in. Twelve 5.5-in.—General Purposes (No Torpedo tubes)	Deck and Side to keep out 16-in. A.P. at ranges beyond 20,000 yards	35,000 tons
Ocean Escort Cruiser	25	Fifteen 6-in. Eight 4.7-in.—General Purposes (No Torpedo tubes)	Deck and Side to keep out 6-in. A.P. at ranges beyond 15,000 yards	8,000 tons
Fleet Gunboat	40 (at least)	Eight 5.5-in. Pair of 18-in. Torpedo tubes	Splinter-proofed vitals	3,500 tons
Fleet Torpedo-boat	45 (at least)	Eight 21-in. Torpedo tubes; two or four 4.7-in.—General-Purpose guns	Splinter-proofed vitals	1,500 tons

CONCLUSION

You will observe that although I am an advocate of speed, it is to be used for taking the offensive in every case except that of the fleet gunboat when she is doing reconnaissance work; then she will use it to dodge and avoid action with superior forces and slip through or round the enemy's cruiser screen until she can sight his battle fleet. The

only class of warship where it can be subordinated to gun-power and armour is in the ocean escort cruiser, whose role *is* primarily a defensive one.

For the rest, nothing makes any difference to that sound dictum of Lord Fisher that to secure victory in battle we must " hit first, hit hard, and keep on hitting." But there is a corollary to that : it was Lord Fisher, again, who recalled a recipe in a Mrs. Glasse's cookery book for " jugged hare." It starts, " first catch your hare " !

DISCUSSION

COMMANDER G. BOWLES, R.N. : The " natural " speed of a ship is that above which wave-making begins, and is given roughly by the square root of her length and by about 1 h.p. per ton of her displacement, so that the " natural " speed of a 900-ft. ship is about 30 knots. In warships, extreme speed, forced far above " natural " speed, shuts out guns and armour. Sea fights are won by guns and not by propellers. Extreme speed in battle cruisers shuts out their armour and so makes them worse fighting ships than battleships. Destroyers are full of extreme speed but can hardly be called fighting ships, being unable to stand any punishment. High-speed aircraft carriers are floating garages which must spend all their time in war running away from any kind of fight ; the rushing speed of the Air Force is unlikely to affect the result in war.

In a fight at sea, give me more guns and armour and less speed, and I will beat an enemy with less guns and armour and more speed. My quicker but weaker enemy can only either run towards me and be sunk, or run away from me and leave me commanding the sea, which is all I want, as long as all my trade is convoyed, as it should be.

At the Falkland Islands battle, our cruisers were so fast, and therefore so badly armoured, that they took seven hours and nearly all their ammunition to sink much smaller German cruisers. It was like two 6-in. gun cruisers taking seven hours to sink a couple of destroyers : extreme speed had shut out armour. The right way to deal with " Scharnhorsts " and " Gneisenaus " is by properly escorted convoys.

Jutland showed that the small difference of speed alone possible can seldom force an unwilling enemy to fight. The way to force an enemy to come out and fight is to put unbearable pressure on his war machine and his people by capturing his cargoes, for war is, now more than ever, a matter of cargoes and the side that gets the cargoes wins the war. The way for us to win wars without armies and by sea power alone is to capture enemy cargoes and convoy our own. Cargo control wins wars without high speed.

For world strategy, more, slower and heavier-armed ships stationed *at* likely danger points are better than fewer, faster and therefore lighter-armed ships that must be rushed there. Rushing about is not fighting, it is a form of hysteria. Tons and money are far better used for decisive guns and armour in battleships of " natural " speed and cruisers of moderately forced speed, than for extreme speed in any form.

Regarding gun power : both ships and guns should be comparatively small and many, instead of huge and few. " Jumbomania " has always been beaten by concentration of smaller units against it. For instance, because two ships can fire at one ship but one ship cannot fire at two,[1] two " half-Nelsons " with six 14-in. guns in each could beat one of our monster " Nelsons " with her nine 16-in. guns, and the two together would cost loss than the one they could beat.

In cruisers, 6-in. guns should be separated, mounted singly and hand worked, not mechanized—which actually slows their firing, and not bunched at the ends as a target for a single lucky enemy shell. Anti-aircraft guns should be " shower shooters," and not bigger than 4-in.

Excessive fuel mileage partially disarms our ships to enable them to steam past eight fuelling stations, and that is bad strategy.

Many of our ships are badly under-gunned and under-armoured because over-speeded and over-fuelled, besides being full of battle-useless things like torpedoes, wireless, hangars and petrol-filled motor kites.

The speed fetish is a dipsomaniac for foreign oil. With reasonable speeds, the British Navy can use any kind of world-wide British coal without it ever being touched by hand or shovel from the collier to the ash ejector, without dust and without smoke ; for our choice in war will be, not coal or oil, but coal or nothing.

The extreme speed craze has deprived our fighting ships of their fighting power, and has put the British Navy in pawn to people like the Shah of Persia.[2]

ADMIRAL SIR SYDNEY FREMANTLE : I wish to criticize—I hope in not too destructive a spirit—some of Captain Altham's remarks.

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[1] This is a misstatement. Modern fire control makes provision for concentrating part of the armament on each of two different targets.—EDITOR.

[2] Any readers who may still be interested in the " Coal versus Oil " controversy are recommended to read the lecture on that subject in the Journal of May 1934, p.241 ; and the summary of the Report of the Falmouth Committee on " Oil from Coal and Wartime Supplies " in the current number of the Journal p. 385.—EDITOR.

In the first place, I cannot help joining issue with him in the idea of a 32-knot battleship, because in designing a battleship one is confronted with the old compromise necessary between speed and offensive and defensive qualities. One school says: "If you cannot go fast enough, you cannot catch the enemy," and the other school says: "What is the use of catching the enemy if he sinks you instead of your sinking him?" One has to arrive at some practical compromise.

I think Captain Altham skated rather lightly over his idea that a superior speed was necessary for battle-fleet actions. My reading of naval history is that battle-fleet actions are almost invariably brought about adventitiously, that is to say, one side or the other does not want to fight an action but gets let into it by mistake. Villeneuve when he came out of Cadiz had no idea of fighting a fleet action, nor had Scheer at Jutland, and Rozhdestvensky in the Straits of Japan hoped to get away without fighting. These battle-fleet actions come by accident and not by deliberate intention. There is deliberate intention, of course, on the part of the side that is ready and prepared to fight, but the action comes about adventitiously when we take both sides into consideration.

In this compromise it seems to me that, taking the three important elements which have to be dealt with in the design of a battleship, offensive power should and must come first, defensive power second, and speed third. When I say that speed should come third, I do not go so far as a well-known naval writer has gone recently and come down to 15 knots or something of that kind; but, as battleships work together and we are never going to have a fleet of brand new, up-to-date battleships, the speed should be a continuously but slowly advancing speed. I am under the impression that the speed of the "Nelson" is 23 knots and that of the "Revenge" 21 knots, and I think we might take, as a practical compromise, 25 knots for the speed of a new battleship.

With regard to the size of gun, it seems to me that if we can get in a good salvo of 14-in. guns it ought to be good enough to knock out almost any ship, and there is not any very great advantage in devoting a considerable amount of the weight available for gun power to 15-in. or 16-in. guns. Therefore I fervently hope that, if we are called upon to make a reply to 40,000 or 45,000 ton battleships, we shall not be led up to immense tonnages of that kind but have 35,000-ton battleships and more of them, with 14-in. guns and a speed of 25 knots.

Captain Altham referred to having twelve 5.5-in. guns for general service in a battleship. I speak with some diffidence in the presence of many officers who are now serving, especially in the presence of our Chairman, but I rather doubt whether one could mount twelve 5.5-in.

guns which were equally suitable for anti-destroyer work and for anti-aircraft work. Surely if they are suitable for anti-aircraft work they are practically without protection, and therefore they are not very suitable for use in a fleet action against destroyers.

With regard to battle cruisers, it seems to me that we ought to have a comparatively limited number of battle cruisers if only to deal with the German "Deutschlands." When the "Tiger" was scrapped, to my certain knowledge (I happened to be Commander-in-Chief at Portsmouth not long before) she was in a most admirable condition as regards her machinery. I wrote a letter to *The Times* pointing out what a mistake it was to scrap her when there were only seven ships in the world (four of ours and three of the Japanese) that could deal effectively with the "Deutschland."

With regard to cruisers, I think the boot is on the other leg in the compromise between speed and arms. The ocean cruiser is no good unless she has the very highest speed which can be given to her consistently with a very moderate armament. I join issue with Captain Altham in his idea of an ocean cruiser going at 25 knots. The assumption seems to be that ocean cruisers would be employed only on convoy work, that they would therefore always wait to be attacked and would employ purely defensive measures. But surely, if news is obtained of any threatening cruiser within a limited distance of a convoy, it is desirable that one or more of the convoy cruisers should move out to attack her and stop her operations in the most effective way possible, i.e., by sinking her, instead of waiting to be attacked. Again, one wants numbers in cruisers, and therefore cannot get very great size or strength. If an enemy big cruiser appears, a smaller cruiser must be able to get away from her, and therefore she must have speed.

I do deprecate the undue differentiation of types. I should like very much to hear from some officer now serving whether big destroyers such as the "Tribal" class, or perhaps one even a few hundred tons bigger, would not be able to replace entirely the fleet cruiser and at the same time be able to fulfil the various functions that have been laid down for destroyers. I should have thought they would be fully capable of it.

ADMIRAL SIR WILLIAM GOODENOUGH: I am of a bygone age and have only that somewhat crippling factor experience on which to base my remarks. What is required for ideas is imagination.

I will, in the main, speak of speed in light craft used for reconnaissance and torpedo attack. Generally speaking, what is the first essential for victory? It is to deflect the enemy from his purpose. To do that you must bruise his head, not his heel. To do that you require speed

to attain the necessary position. All ships are compromises, or rather are the results of what can best be made of three things—speed, armament, and armour.

Captain Altham spoke somewhat easily with regard to reconnaissance as to slipping through or going round. Slipping through is not possible in ordinary visibility, and an impossible speed would be required for going round. One must be prepared to push through, not slip through, to obtain information, and here I would say that it appears to me that not half enough has been said as to the obtaining of information from aircraft; but that may be outside the present discussion.

Speed in reconnaissance is required in order to regain the requisite position should the first attempt at such be abortive. Much thought and much self-denial is required for this part of naval action: of how a squadron should not be used for work that one ship can perform; of why so many cruisers or light craft are required so that a captain may range widely, knowing that there is someone else to take his place should he fail in his first endeavour. You should note that I, for instance, closed my squadron together too soon on the 31st May, 1916. I should have remained spread, or re-spread my ships after I had taken up my position on the junction of the Battle Cruiser Fleet and battleships. But here again I may be digressing.

Then, again, the light cruisers should have high speed to be able to gain and regain their position for torpedo attack at deployment. Equally important is another speed—that is speed of mind on the part of the officers commanding light cruisers in order to seize on the opportunity offered. I would sacrifice a good deal in the matter of gun armament and size to have ships with sufficient speed to attain these objects. All this can be elaborated to any extent by officers who know their business.

With reference to Captain Altham's remarks as to the "Emden," my recollection is that Captain Silver did stand by his convoy and sent another ship to engage and destroy the enemy, and that his action in doing so gained him, rightly, much credit.

COMMANDER R. GRENFELL, R.N., thought there would be an administrative difficulty about building a class of special trade-route cruisers. When a cruiser was built, you could hardly send her off in peace time to steam about the trade routes by herself. From considerations of training and discipline she would have to join one of the fleets. In that case, a 25-knot cruiser attached to 32-knot battleships would be unable to do its work. He thought that cruisers would of necessity have to be general service ships, which could act as fleet cruisers or trade-route cruisers as required.

As regards the general question of speed and fighting power, he thought that Captain Altham was right in theory in his demand for high speed. But was he right in practice? Looking back over history, it was difficult to think of any important battles that had been brought on by superior speed. In the Napoleonic wars, the French ships were, generally speaking, better built and faster than our own, yet that did not prevent us from bringing them to action on a good many occasions.

REAR-ADMIRAL H. G. THURSFIELD: Various speakers have stressed the point that what we want is fighting power—offensive power. As an old torpedo officer, I should like to put before you the point that a torpedo is essentially an offensive weapon. We have to take it to the enemy and fire it at him; when that is done the result is very often decisive. The only battle in the Spanish War which has recently taken place was won, not by the guns which scored no hits at all, but by torpedoes. Yet I gather from recent publications that we have been removing torpedo tubes from our ships and replacing them with defensive features in the shape of armoured decks and anti-aircraft guns. An anti-aircraft gun is essentially a defensive weapon: you have to wait for the aircraft to fly over and attack before it can be used at all. That seems to me to indicate (I throw out this idea merely for discussion) that we have perhaps been sometimes swayed too much by considerations of defence and not enough by the offensive spirit.

ADMIRAL SIR R. G. H. HENDERSON: I should like to defend the torpedo. Although the torpedoes may have been removed from the battleships, we still have them: they are carried by aircraft, so that instead of being carried at 25 miles an hour they are carried at 250 miles an hour.

CAPTAIN A. C. DEWAR, R.N.: I do not think it is quite clear whether high speed is required for strategical purposes—to catch the enemy, or whether it is to be used for tactical purposes when the enemy is engaged and we are actually fighting. I remember that in a lecture we had here nearly thirty years ago, when Admiral Sir Sydney Fremantle's father was here, there was a discussion about that. Most people thought that at least 5 knots superior speed would be required to be of much use actually in a battle. Nowadays we have got aircraft, and if aircraft can give information of an enemy, say, sixty miles off, I do not see that speed is going to help much if one or the other wishes to avoid a battle. If the enemy hears that a fleet he does not want to fight is sixty miles off, he ought to be able to keep away from it.

Admiral Fremantle has stated that battle fleet actions are usually adventitious, and I venture to agree with him. Take, for instance, the Coronel battle. It was getting towards evening and both sides wanted to fight, but if the "Good Hope" had desired to keep away I think

she could have done so, even if the " Scharnhorst " had been able to catch her. In another hour or two it would have been dark and she could have got away. In the case of the Australian convoy and the " Sydney " and the " Emden," there were three escorts with that Australian convoy, the " Melbourne," " Ibuki " and " Sydney," and the " Sydney " was detached and made for Cocos Island ; the " Emden " had anchored there and landed her First Lieutenant, two other Lieutenants and 44 petty officers and men ; she did not get them back ; they were left on the island and got away in a schooner. The Dogger Bank was the only action in which an extra couple of knots speed might have helped our battle cruisers, but in the other actions I suggest that it was a matter of the particular time of day and the particular geography and the fact that one of the combatants did not want to fight. Admiral Fremantle has laid stress on that point. If both sides want to fight I do not think that very much speed is required, except tactically, and if one side does not want to fight I am not sure that the other side will ever get hold of him except by chance.

CAPTAIN E. ALTHAM, R.N., in replying to the discussion, said : First of all I must join issue with Commander Bowles in his statement that an enemy can only run towards us and be sunk or run away and leave us commanding the sea ; that is not quite the whole story : we would like nothing better than that he should run towards us, provided that we had got more powerful ships ready to attack him ; but if he runs away from our more powerful ships, he can still sink our weaker ships, especially our merchant ships ; and if we have not got the speed to catch him, he can go on running and sinking and running and sinking until he has most successfully deprived us of our sea communications.

With regard to Commander Bowles' argument that one of the few things which would force an enemy battle fleet to fight was economic pressure, I suggest that four years' economic pressure on Germany signally failed to force the German fleet to do so.

COMMANDER BOWLES : It was only one year. The Foreign Office would not allow us to put the blockade on for three years.

CAPTAIN ALTHAM : The degree of economic pressure was intensified as the War went on, but even when it was most intense of all—in the last year of the War—nothing would induce the German fleet to come out and deliberately seek an action.

COMMANDER BOWLES : There was a mutiny caused by the blockade ; that was what stopped them coming out.

CAPTAIN ALTHAM : Quite so ; when they did try to come out the whole " war machine " blew up ! In a future war I do not think we shall be

able to wait all that time; in these days, time is a vital factor in any war.

COMMANDER BOWLES: It took only four months of blockade. You do not want much time if you start at the beginning.

CAPTAIN ALTHAM: Commander Bowles also said that high speed is not fighting, but I suggest that high speed enables us to fight. I said in my conclusion that I wanted high speed to be used in every case to enable us to take the offensive.

Admiral Fremantle said that battle-fleet actions came about adventitiously, and Commander Grenfell agreed with him. I would suggest, however, that we must not be guided too much by what took place in the old sailing days. Very often the difference in speed was extremely slight, and sometimes the wind was so light that the fleets literally almost drifted towards each other. At Trafalgar, Nelson had manœuvred into a fine strategical position, and there was just sufficient wind to enable him to put his tactical plan into effect and get into action. On the other hand, when we come to the days of steam, at Jutland, I think there is very little doubt that the knot or two of speed in excess of what our High Command believed the High Sea Fleet possessed was a distinct tactical advantage to Scheer. The whole evidence of the history of the War seems to me to be that the enemy used his speed in such a way that, when we did have a chance of meeting him, he avoided action; and I suggest that, in future, unless the enemy sees a good chance of engaging us with superior forces or in a situation of marked tactical advantage, he will try to avoid action, and we shall not be able to bring a battle to a victorious issue unless we have speed to make him fight it out to a finish.

With regard to the 5.5-in. "general purposes" guns which I have suggested, I know that certain foreign navies have already got what I imagine is a fairly satisfactory design. There is no great difficulty, so far as I can see, in designing a gun with 90° elevation and which will also have an adequate angle of depression—in fact, we had it in the original 3-in. A.A. mounting; nor can I see any difficulty in putting some light armour over it. I believe in foreign ships such guns are usually mounted in pairs.

I fully expected that my ocean escort cruiser would be criticized. I did, however, make the proviso very clearly that she could not be called upon to do fleet work. I cannot quite agree with Commander Grenfell's suggestion that in peace time all our cruisers must go and learn their work with the fleet, even though they are not going to be used with the fleet in time of war. If there is a need for a special design of cruiser for protecting convoys, then she should learn her job out on the ocean routes

and not keeping station with the fleet. If, on the other hand, it is decided that every cruiser must be a " general purposes " type capable of doing either fleet or convoy work, then I withdraw my design for a slower but more heavily armed and armoured escort ship ; but I maintain you will only get a bad fleet cruiser and a bad ocean escort cruiser.

Although Admiral Goodenough criticized some of my remarks about fleet-cruiser functions, I venture to suggest that what he said was not so very different from what I put forward. He took rather too literally my use of the term " slipping through," and suggested that there must be a good deal of " pushing." In the work of fleet cruisers there is probably a bit of " slipping " and a bit of " pushing." For " slipping " they have undoubtedly got to have speed, and for " pushing " they must have guns ; but they cannot get through by " pushing " alone. Yet, with a very light and very fast ship, surely her object is to avoid " pushing " as much as possible (I do not say she will not have to push occasionally), and to use her speed to get information without having to fight for it. We know that at Jutland the light cruisers had to do a certain amount of " pushing " at times, but I venture to suggest that it was their speed quite as much as, if not more than, their guns that enabled them to do such valuable work.

I am glad to find some torpedo officer standing up for his own weapon because we have rather a heavy barrage of old gunnery officers here to-day. My objection to the torpedo in a battleship is founded on the fact that we have to eliminate everything that is not absolutely essential, and in a battleship I cannot see that the torpedo can be kept in the category of essentials. At Jutland, the battleships on both sides had torpedoes, but made no use of them whatsoever. They are being taken out of nearly all older foreign battleships and are not being put into the new ones. They have their uses, undoubtedly, and, as Admiral Henderson has pointed out, possibly one of the best places to carry them, instead of in battleships, is in aircraft.

With regard to Captain Dewar's question as to whether I want speed for strategical or for tactical purposes, my answer is that I want it for both. It is required for strategical purposes when, perhaps, his aircraft have given our Admiral information as to where his adversary is, to enable him to manœuvre into a position from which the enemy fleet cannot escape ; and then it is required for tactical purposes to hold the enemy in action until he has been defeated.

THE CHAIRMAN :

Might I suggest that we all agree that the designing of a warship is a compromise ? Does anybody disagree with me on that point ? I take it by your silence that you agree.

Our first speaker this afternoon, Captain Altham, was for speed, and the second speaker, Commander Bowles, said in effect: "Speed be damned!" He put it in a slightly different way, but that was really what he meant. Commander Bowles was a little less inclined to compromise than Captain Altham.

Captain Altham asked for a 32-knot ship. I think that the "Queen Mary," which is a 32-knot ship, has a standard displacement of about 50,000 tons. She has no armour and no guns, and that is practically the ship that you will get for 32 knots. I think you will admit that there is in any one year what might be called an optimum speed. I do not think that for any battleship it can be in the region of 32 knots. Perhaps some of you may disagree with me, but I am talking about real speed. We know that the "Queen Mary" can do it, because she has to do it on every voyage between Southampton and New York. There are various foreign battleships on the printed list that we have before us which are given certain speeds, but they achieve those speeds as the "Queen Mary" does, i.e., without guns, without protection, and without fuel. They are not even quite as good as the "Queen Mary," because she does carry sufficient fuel. Therefore, when we are considering designing our battle fleet let us keep to what we can really get without sacrificing too much in other ways.

The object put forward by Captain Altham was to protect our own trade routes and deny trade routes to the enemy, and the other speakers started with the idea of supporting that object, but they all with one accord got into the battle!

In conclusion, I will read you the one note that I made before I came here, knowing how the discussion would develop. It was this: "Running away tactics never pay in the end. You generally have to fight for what you want in war."

I do not understand that it is my task to intimate which side has won in the debate, so we will leave that still in the air.

A vote of thanks to the Chairman was carried by acclamation.

Note.—Correspondence on this subject is invited. A letter on the subject of "optimum speed" appears on p. 411 of this Journal.—EDITOR.

DOES DEFENCE MEAN DEFEAT?

By Major E. W. Sheppard, O.B.E., M.C., *p.s.c.*, Royal Tank Corps

THE question of what should be Britain's policy and strategy in a future great war in Europe has aroused considerable public attention and discussion since the appearance late last year of a series of articles in *The Times* by Captain Liddell Hart, that journal's military correspondent. The thesis therein put forward was that, under conditions of anything like equality, the strength of the defensive in land warfare to-day has become so great as to render the possibilities of decisive success on the part of the attacking army too precarious, and the cost in casualties—whether of incomplete victory or of complete failure—too excessive, to be worth while. Only great superiority of some sort could therefore justify the assumption of the offensive role, such as, for instance, far larger numbers, a new tactical weapon, or great superiority in armament on the material side, or a definite disparity in discipline, training, or morale in the non-material field. It was further contended that as our peace-time army would, at the beginning of any foreseeable European war, certainly be inferior to its adversaries in numbers, and at the best no more than equal in armament, and could count on no serious disparity in its favour on the moral side, it would possess none of the prerequisites for a successful offensive role, and should therefore eschew it. On the other hand, the present strength of the defensive should make it possible for us to achieve our political aim, which in any future war will be merely to hold what we have, without it being necessary for us to assume the offensive in the military field at all—but only on condition that we have thought out, practised, and become expert in the best means of taking full advantage of the defensive form of warfare.

Now this thesis can be assailed on two grounds. Either the facts on which it is based, and therefore the deductions from them, are wrong—that is one possible ground; or the deductions themselves may appear so repulsive, or inglorious, or disastrous to our national and imperial interests, that it is impossible for us to accept them, and we must at once set to work to alter the facts from which they have been deduced—if we can. There is no third way of assailing or upsetting the thesis—no other answer to it. Abusing the author of the thesis on the ground that he has propounded it only " for the sake of originality and the advertisement that it brings " is not an answer—nor, incidentally, is it consistent with the usual conventions of polite controversy, in which it is customary

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to assume that one's opponent, like oneself, is engaged in a disinterested search for truth. Misrepresenting the thesis by talking of its " naivety " or " risibility," by accusing it of being based on " a distortion of history," and of being " a confession of mental bankruptcy "—all these strictures, however vivacious and amusing, are not an answer. The only effective answers are those above-mentioned. Either refute the facts and overthrow the deductions from them, or, failing this, if the facts are found too unpalatable, set to work to alter them.

Difficulties of the Attack

First then, for the facts. It is well known, and recognized by all historians of the Great War, that it " exemplified the formidable difficulties of the attack." For four years the adversaries on the Western front strove in vain to break through each other's lines and attain a decisive victory. But though the casualties were measured in hundreds of thousands, the expenditure of material and munitions in millions of tons, the financial cost in astronomical figures, neither side managed to achieve a Waterloo or a Sedan in the field, nor were their fronts ever broken through or shattered.[1] In other words, the defensive, whether employed by ourselves or by the Germans, always eventually managed to hold the assailants at bay, and Germany was brought to her knees primarily by the incessant pressure of moral, economic, and social, rather than of military, forces. Exactly the same strength of the defensive was shown at Gallipoli, in Italy, and in the earlier fighting in Palestine and Mesopotamia. Only when we had amassed a three-fold numerical superiority, and an even greater superiority in material and armament, over the Turks, could we secure decisive victory in the two last-named theatres, while the military results of Caporetto and Vittorio Veneto were due as much to economic and moral as to military causes. The strength of the defensive in the years 1914–18 was proved over and over again in every theatre of war. This is not " theory spinning " or a " plausible cliché " ; it is a naked and patent fact, and there must be many millions of old soldiers alive all over Europe still—and as many millions dead—who from personal experience then knew all about it.

Now, has this fact been altered in the twenty years that have passed since the Great War ended? It is impossible to find any good reason for believing so. Guns are neither more numerous nor more powerful in a present-day army compared with those of that time, and nothing has been done—or could have been done—to abolish the limitations inherent in artillery attack—the time necessary for its preparation, the

[1] In connection with this expression of opinion, attention is invited to the article " Was Germany defeated in 1918," on p.392 of this Journal—Editor.

difficulty of securing surprise, the pauses between stages, and so forth. Tanks, so powerful in the last war, will now have to meet very different and far more potent forms of anti-tank defence, in which opposing tanks will play a leading role, and will lose much of their material and moral effect. There are apparently no new military gases of value to be found or utilized, and the known gases are no longer decisive against protected troops. Motorization, and the increased mobility it has brought with it, is as useful a weapon in the hands of the defender as in those of the attacker—if not more so, for it enables a more rapid movement of reserves to counteract in part the ill effects of surprise and local numerical weakness. The impotence of the offensive to overcome the resistance of the defensive has therefore increased rather than diminished in the last twenty years, inasmuch as the devices by which, though only at enormous cost, it succeeded in gaining the partial and indecisive victories registered by it in the Great War have now lost much or all of their former value, and no new ones have as yet been found to supplement or replace them.

It is further to be expected, as regards our own Army, that at the outset of any future war in Europe it will certainly be in a considerable numerical inferiority to any possible enemy, while, if such a war broke out to-morrow, its armament and equipment would be inferior too. The latter defect will tend to diminish as our rearmament nears completion; the former, in default of a revolution in our military system, will persist. To that extent, therefore, we shall always be at a definite military disadvantage, which must render our Army peculiarly unsuited to play an offensive role, at least in the early stages of any European conflict.

The thesis, therefore, runs as follows: The Great War affords conclusive proof of the difficulties of the offensive by a military force on land. These have, if anything, increased rather than diminished since then. Only an army that can rely on great material and moral superiority to its adversary can adopt an offensive role with any hope of success. Our Army, at least at the outset of any future war with a great Power in Europe, can expect to enjoy no such superiority. Therefore it is unlikely that it will be possible for it to attack, or to win by attacking.

Now what has Colonel Beadon, in his article to which this is a reply, to say about this? Let it be clear that we are concerned at the moment, not with the unappetising consequences of the facts, but with the facts themselves. "Let us face facts and eschew ostrich-like postures" as he himself puts it, with great vigour, if less elegance. But the posture of facing facts has its difficulties, as he seems to have found. For his idea of doing so seems to consist solely in denying their existence, with a breezy disregard of evidence, probability, and plain commonsense more entertaining than convincing.

Improbability of Rapid Decisions

His first plea is that the next war may not be like the last, " it may be short, sharp and decisive—there may be no stabilisation in the next campaign." It is possible; all things are possible; but is it likely? In the event, for instance, of another war in France, for which we have principally to be prepared, the theatre of operations will be as before; numbers, armament and equipment will be on much the same scale as before; and the fortified lines into which the armies, after six weeks of open fighting, settled down into trench warfare in 1914 are already in existence on both sides of the Franco-German frontier. What reason then has Colonel Beadon, or anyone else, for anticipating a short, sharp, decisive war without stabilization? Obviously none, except that the wish is father to the thought.

He then goes on to say that " there is no reason for us to renounce the problem as insoluble. The huge totalitarian armies are for use, and it must be their intention to seek the solution of the offensive problem." Seeking, however, is not the same as finding; the search for the philosopher's stone has gone on for many hundred years, but it remains unsuccessful for all that. " Why should it be considered as axiomatic," asks Colonel Beadon, " that because the late war showed that modern weapons gave a preponderating power to the defence, such conditions must necessarily continue to obtain? Is it inconceivable that ways and means of redressing the present balance cannot [*sic*] be found? " The conditions of the late war must be expected to continue to obtain because nothing has so far occurred to alter them; and though ways and means of redressing the present balance may possibly yet be found, the fact is that at present they have not been found, and there is nothing to indicate that in the near future they are likely to be found. The thesis we are discussing bases itself on facts as they are to-day, and, as far as can be foreseen, will be to-morrow. Colonel Beadon, confidently trusting in the larger hope, assures us that somewhere, somehow, somewhen, in the sweet by-and-by, things will be quite, quite different. It is in this sure and certain hope, this fervour of faith in a rosy future—a faith corresponding exactly to the schoolboy's definition of that virtue as " believing what you know ain't so "—that he is cheerfully prepared to call upon the nation to " stand a great deal more than was involved by the slaughter of Passchendaele and the Somme—a trifle of three-quarters of a million casualties, a mere bagatelle—for fear lest " our self-confidence should be destroyed " and in order that posterity, when reading of our part in a future war, may be spared " a sense of embarrassment " at some " great refusal." Such a policy can only be done justice to in the biting words of Voltaire, " The art of war is like the art of medicine, murderous and conjectural."

In sum, Colonel Beadon has really nothing to oppose to the facts of the thesis under discussion. He merely dislikes the deductions. That, of course, is a common enough state of mind; his pet ostrich shares it, and takes the graceful and effective way of showing it familiar to us all. But assuming that we are prepared to face the facts and the deductions, what is our next step? If we want to do something we are not at the moment able to do, there are two ways out. We can either set to work to remove the obstacles that prevent us doing what we want, or—as is more easily and more commonly done—we can think again and decide that, after all, we do not really want to do it. However, since it is obviously an excessively foolish policy to go to great expense and trouble to provide ourselves with something which is later found not really to be wanted at all, let us examine and see whether it is really essential for us, in the event of a future great war, to be able to take the offensive on land.

Arguments for Defence

If we grant, as Colonel Beadon himself grants, that "we are peaceable, we are satisfied; we covet no man's possessions; we are a defensive as opposed to an offensive Power," then it follows that if we can hold what we now have we shall have achieved our purpose in any such war. But the opponents of the defensive thesis deny that this purpose can be achieved by a defensive policy or a defensive strategy on land, which they say has always in history led to defeat. Assuming it to be true that the defender is always the loser, it by no means necessarily follows that the principal cause of his defeat is to be found in the fact of his having chosen to adopt a defensive attitude. It is more often inferiority of military means than faulty use of adequate means that loses battles and wars. The chain of causation is not: I defend, therefore I am defeated (as Colonel Beadon would have us believe). It is: I am inferior, therefore I have to defend; therefore I am defeated. The adoption, often willy nilly, of a defensive attitude in history is not a cause but a manifestation of inferiority. If it were in truth a cause of inferiority, the weaker side would obviously seek to compensate for its weakness by acting on the offensive—which is absurd, as Euclid would say.

Advantages of the Defensive

In past history a defensive policy has usually been adopted because of the defending side's weakness—not only initial but progressively increasing as time went on. The British Empire in any future war will not be in this unhappy position. Though militarily it will certainly be

compelled to stand on the defensive at first, it will be progressively growing stronger with every month of war. It can afford therefore to hold its ground and bide its time, while seizing any chance to dislocate its enemy's offensive efforts or inflict losses upon him by the *ripostes* and counter-attacks which are, or should be, the soul of the modern defence. In this art the Germans in 1917 gave us a series of admirable lessons, from which, both then and since, we have unfortunately failed to profit. If the next war, in fact, is to be a wearing-out struggle, we shall certainly be in a position to last out the longest, provided that we can survive the first critical period of inevitable inferiority on land and are not too vulnerable to a hostile air offensive. In a word, we must in any case at first rely on the strength of the defensive in a future war, because of the inferiority of our army as compared with those of our possible opponents, but this successful defensive fighting should enable us to hold what we have, and the longer the struggle lasts, the less will become the enemy's chances of breaking our defence down.

It is obvious that our army must be made and kept strong enough in peace-time to assure the safety of our possessions against attack—which it certainly is not in a position to guarantee at present. But that in the later phases of such a war, we should follow our policy of 1914–18 and raise a huge national army for a Continental land campaign, would be wise policy only if Colonel Beadon's philosopher's stone, which is to restore the balance between offensive and defensive, has meantime been found and, one must add, recognized and proved, for it may well, like the first design for the tank, have been discovered only to be pooh-poohed and pigeon-holed. Otherwise it would be well to put the bulk of our national effort into expanding the air arm—according to Colonel Beaden "the most destructive offensive weapon of all time"—and utilize its great potentialities in the offensive, rather than trust mainly to those of land forces.

But we cannot have it all ways, and it is impossible to believe that Colonel Beadon has really failed to understand the thesis about the division of power put forward by Captain Liddell Hart in this connection. Our manpower, and our material and money resources, great as they are, are not unlimited, and it may well be better policy for us to devote the bulk of them to raising, equipping, and maintaining a large and up-to-date air force, with its great offensive potentialities, rather than to providing ourselves with an army on the Great War scale, with its limited powers of attack. Even at the outbreak of a new war, any Continental allies we may have would almost certainly rather have the assistance, instant and potent, of a formidable British Air Arm than of an Expeditionary Force which might well be too late for the first critical

fighting, and would at best add but little to the strength of their own massed armies.

Suggested British Policy

The policy of the British Empire in preparation for any future conflict should therefore be to possess a fleet able to keep the seas, an army able to safeguard her land frontiers, and an air force which can carry the war into the enemy's country and exercise pressure on him to force him to abandon his aggressive purposes, if the realization that these cannot be achieved does not induce him to agree to a negotiated peace.

Colonel Beadon's objections to this thesis are manifold and violent, but may be summarily disposed of. The historical objection that defence always means defeat, has already been dealt with, and shown to be nothing more than the old, invalid *post hoc, ergo propter hoc* argument, still so generally beloved but still fallacious. He denies that " the defensive is in our blood," and hotly repudiates as a base libel the assertion that " a British soldier cannot attack and overthrow a redoubtable enemy." But the point surely is not what we could do if we tried, but what we want to do, and in war to achieve one's aim is usually quite a heavy enough tax on one's resources, without launching out into what the theologians call " works of supererogation." He dreads the demoralizing effect on her allies of our announcement " that we are not prepared to throw all our resources into the struggle." The thesis under discussion is not at all that we are not prepared to do this, but that to strive to build up an army strong enough to take the offensive under present-day conditions would be a misapplication of those resources. Our allies may or may not agree with this proposition, but it would hardly have been maintained, even by the American general in Colonel Beadon's story who did not " care a damn if his allies led him by the nose in the right direction," that any ally of ours has the right to lead us in a wrong one. In actual fact, there is no reason to suppose that France, or any other ally of ours, would not prefer our assistance on the Continent to take the form of a strong air force rather than of the weak military force which is all that we should have initially available to send. The former would certainly be at hand far more swiftly and surely; and it is in the first critical days and weeks that our help will be most needed.

If we have in the past utilized offensive methods with success, we did so, firstly, because we or our allies—often both—had aggressive aims, secondly, because the balance of offensive and defensive was then in the former's favour, and, finally, because we had the means of employing such offensive methods with good prospect of achieving our aims.

None of these conditions are present to-day. Our aims are no longer aggressive but defensive. Why then should it still be thought necessary for us to employ the same methods, under totally different conditions, for a totally different purpose, and with only remote prospects of success? Colonel Beadon himself admits that "in certain circumstances or for certain periods the strategical defensive has best responded to our aims and has accordingly been adopted," yet the contention of those who believe the thesis of which he so evidently disapproves is merely that this is one of the times, and present-day conditions among the circumstances, that call for the adoption of a defensive policy and strategy once more, and that our small military forces should adapt themselves to this state of affairs and be trained and utilized so as to draw all possible advantages from it. There is nothing in Colonel Beadon's strictures to shake, and much to confirm, the convictions of those who accept and champion this doctrine, as being the logical consequence of the facts which he himself does not, and indeed cannot, deny.

THE BATTLE OF WARSAW, AUGUST, 1920
AN EXAMPLE OF THE COUNTER-OFFENSIVE

By Major E. R. Mahony, Irish Guards

"Fortune is a woman who must be wooed while she is in the mood. If her favours are rejected, she does not offer them again."

The Emperor Napoleon.

THE Battle of Warsaw, August, 1920, has the distinction of being listed amongst the decisive battles of the world. In spite of that, however, it has received but scanty notice from British writers. Apart from its political results, which were momentous for Europe, it was a military operation of exceptional interest. The opposing commanders have each furnished accounts of the battle, and the late Marshal Tukachevsky in giving the narrative from the Russian side, adopted the course, unusual amongst Generals, of emphasizing his own mistakes. The historical background of the battle was formed by events, which were taking place in Eastern Europe in the year 1920, as a result of the Bolshevik Revolution. At the end of 1919, the "White" Russian forces in South Russia were engaging the attention of the Red Army, and the Poles found the moment opportune to launch their army upon an invasion of Russia. Despite lack of training and cohesion the Polish troops entered the Ukraine and captured the city of Kiev. The Polish victory at Kiev spread consternation in the Red Army circles, and spurred its fiery mentor Trotsky to declare that the Poles must be driven from Russia, and the war carried into the depths of Western Europe. The Poles were attacked. They had underestimated the strength and fighting qualities of the Red Forces. They were pushed back 400 kilometres in forty days, not so much by hard fighting, as by the threat of being continually outflanked. Europe watched. Feeling ran high. The Russians had many friends. The Governments of England and France wishing to aid the Poles, heard furious protests from their Socialist Parties. German workmen refused to handle war material destined for the Polish army. The Second Congress of the Communist Third International sitting in Moscow, deliberated upon the steps to be taken when the democracies of Europe had been destroyed.

The facile advance of the Russian Army, the fervour of the new political faith, and the incompetence of the Poles, caused the mind of the Russian Commander, Tukachevsky, to soar into realms far removed

from the precincts of the battlefield. Paying little attention to the movements of the Polish troops, he scanned the map to the westward of Warsaw, bent on continuing his victorious thrust to the utmost limits which circumstances would permit. The people of Warsaw, accustomed more than any others in Europe to invasion through the centuries, were undismayed by the enemy's approach. The French and British Missions which had been sent to Warsaw to stimulate resistance, found themselves well-nigh powerless in the face of apathy and irresolution. It was only at the end of July that the Poles consented to approach General Weygand to solicit his help and advice.

The opening days of August, 1920, saw the crisis developing with great rapidity. The Polish army was in sorry case. Harried on its flanks for three hundred miles by swarms of Soviet horsemen, hampered by straggiers, and short of training, experience, and equipment, it closed on Warsaw from the East a disorderly and disorganized mass. On the evening of the 6th August, the Russian forces had advanced to within thirty miles of the capital. Feverish and belated attempts were now being made to defend it. A ring of trenches had been dug around it at a distance of twenty kilometres and fifty thousand men were told off to man them. While these momentous events were happening outside the city, a still more important one was taking place within. A Polish General sat alone in his study examining intently the map before him. This man was the late Marshal Pilsudski. Amidst the confusion, incoherence, and anxiety, which at times of military crisis are liable to invade the souls of average men, the mind of this great leader was imperturbably planning an audacious and brilliant counter-stroke. The nature of that counter-stroke, and the lessons it brought out, this article will now endeavour to narrate.[1]

The Russian Plan

By the evening of 12th August, the Russian forces approaching Warsaw were strung out along a front of some 300 kilometres. Their right flank rested on Djaldowo, near the East Prussian frontier; their left in the neighbourhood of Hrubieszow, 100 kilometres South-East of Lublin. This dispersion was accounted for by numerous reasons, not the least important of which was that Tukachevsky did not intend to attack Warsaw frontally with the bulk of his forces. The Russian strategy looked beyond the mere seizing of the enemy capital, and was ambitious to effect at one stroke the complete destruction of the Polish forces and the capture of the Government. Could these objectives be attained, Germany and Western Europe would lie open to future

[1] See Map facing p.308.

invasion. With these ends in view, orders were given by the High Command to force the crossing of the Vistula North and South of the city, and thus capture it and its Government by encirclement. Fourteen Divisions of the 3rd and 15th Soviet Armies were allotted the task of carrying out the northern operation. They were to advance on a front of seventy kilometres, drive the enemy beyond the Wkra, and then, crossing the Vistula in the vicinity of Modlin, surround Warsaw from the North and West. The 4th Russian Army was to manœuvre on the right of the 3rd and 15th Armies, and by means of a wide sweep westwards to interpose between Warsaw and Thorn, with the object of cutting off any attempt at a Polish retreat. While these movements were developing to the northward, the 16th Soviet Army was to press frontally against the capital, fix the troops defending it, and then pass detachments across the Vistula at Gora Kalwarja towards the South-West, with a view to shutting the circle. The Russian armies in front of Warsaw numbered about sixty thousand men. The Russian 12th Army, though it took no part in the Warsaw operations, figured prominently in the strategical conceptions of the commanders of both sides. This army formed the extreme Left wing of the Soviet line. While the group under Tukachevsky were advancing due West on Warsaw, the 12th Army under Budienny was moving due South on Lemberg. At about the period of 12th August, therefore, the two main Russian groups were moving away from each other at right angles, and the 12th Army had reached the neighbourhood of Hrubieszow. The only contact which remained between them was that provided by some scattered detachments in the vicinity of Lukow, known as the Mozyrz Group.

The Polish Plan

The position of the Polish forces between the 6th and 12th August was such as to cause Marshal Pilsudski intense anxiety. The situation looked gloomy and desperate. Not only were the troops demoralized, as a result of a long succession of reverses and retreats, but they were very short of all kinds of equipment; and some of the higher leaders, instead of working with cohesion, were torn by dissension and disagreement. The 1st Polish Army, composed of the 1st, 8th, 10th, and 15th Divisions, took up position in front of Warsaw between Zegre, on the Bug, and Karczew. The 5th Army containing the 9th and 18th Divisions covered Modlin: its right in touch with the 1st Army, its left resting on the Wkra above Sochocin. Between the left of this Army and the East Prussian frontier was an undefended gap about sixty kilometres wide. The 4th Army was in retreat towards the South-West, and was being driven back on to the line of the Vistula between Gora-Kalwarja and

Deblin. The 3rd Army was in the area Lublin–Chelm, watching Budienny's cavalry.

Marshal Pilsudski decided to stake all on a bold and unorthodox stroke. Noting that the direction in which the 4th Army was retiring would bring it on to the Vistula between Gora-Kalwarja and Deblin, an area which contained no bridges, he ordered this force to disengage itself from the enemy at all costs, and then, side-stepping towards the South, cross the River Wieprz and reform on the southern bank between Deblin and Lubartow. This manœuvre made it necessary for the 4th Army to undertake a march across the enemy's front, before executing which they had to break contact with the 8th and 10th Divisions of the 16th Russian Army. The Polish movement succeeded, because these Divisions of the Red Army were suddenly ordered to march North-West to take part in the attack upon the capital. With the three Divisions of his 4th Army safely in the concentration area South of the Wieprz, the Marshal had the nucleus for a new striking force. But the search for more troops with which to augment it was proving an almost insoluble problem. He could not weaken the Warsaw front, nor did he deem it prudent to reduce the strength of his 3rd Army, charged with the task of watching the Soviet 12th Army. Nevertheless the situation was less dangerous in the South. Polish morale was higher, and the Russian 12th Army, which had lately been roughly handled on more than one occasion in the Ukraine, was not showing signs of much activity. After much anxious deliberation Pilsudski decided to call in two of the Divisions from this 3rd Army, and move them up to join those of the 4th in the concentration area. The days that passed while this regrouping was taking place were ones of great anxiety for the Commander-in-Chief. Even should the concentration be successfully effected it would only produce a comparatively small force with which to launch what was meant to be a decisive counter-stroke.

The conclusions which the Marshal had arrived at in his appreciation of the general situation of all the Polish armies were such as to further preclude any feelings of optimism. He had assumed, with every justification, that the objective of the Bolsheviks was Warsaw, and that they would consequently group their entire army for a close investment of the city. He neither suspected nor received news of the wide outflanking movement which fourteen Divisions of the Red Army were about to carry out round the North of the city by Ciechanow and Djaldowo. Under these circumstances, coupled with the knowledge that Polish morale was at full ebb, Pilsudski was harried by the conviction that the first determined Bolshevik onslaught against the ten weak Divisions defending the city would suffice to land the enemy within the gates.

Should this attack be delivered before the striking force on the Wieprz was able to debouch towards the North, then the fate of Polish arms would be definitely sealed. Time, therefore, was vital, and not for the first occasion in the history of war, nor for the last, did this abstraction scourge the spirit of one who was about to exploit, by a gambler's throw, the fascinating art of strategy. It will be seen then, that the circumstances confronting the Marshal embraced all those problems, psychological, material, and abstract, which when met with on the battlefield confound the doctrinaire, but which as often as not can be manipulated for victory when subjected to the dictates of a resolute and enterprising will. If Pilsudski had good reason to believe that time was against him, he was unconscious of the fact that luck was with him. His plans for the counter-stroke from the Wieprz fell into the hands of detachments of the 12th Soviet Army, but the Red G.H.Q. refused to treat them as authentic. He had luck in the North as well as in the South, because the outflanking movement entrusted to the Soviet 4th Army needed time to develop, and the attack on Warsaw was consequently delayed.

The Counterstroke from the Wieprz

The Bolshevik attack on Warsaw opened on the 13th August. On the evening of the previous day the Marshal had left the city to take command of the five Divisions on the Wieprz. Before leaving he had a final conference with General Sosnkowski, and impressed upon him the importance of vigorous action by the Warsaw troops so as to hold the attention of as large a portion as possible of the Red Army. On arrival at his H.Q. at Pulawy he found the morale of the troops awaiting him there to be better than he expected. As regards supplies and equipment, however, they were in sorry plight, and required some days for rest and reorganization. He therefore fixed 17th August as the date for the opening of his attack, and devoted the intervening days to inspections and readjustments in the armament of the troops. The reports from Warsaw, which were at first reassuring, had changed very quickly to an alarmist tone. The Soviet attack had penetrated to the suburb of Radzymin, and reports of Red movements near Plock and Wloclawek were also coming in. This information caused the Marshal to advance the date for his flank offensive from the 17th to the 16th.

At dawn on the latter date the Polish troops forded the Wieprz and were launched on their hazardous enterprise. Their objective was the line of the road Brest–Litovsk–Warsaw. They had scarcely got under way before Pilsudski was assailed from Warsaw with urgent requests for help, an experience well calculated to cause a less resolute commander to alter or modify his original plan. The 21st Division on the

right was soon in contact with light enemy forces who fled in disorder on being attacked. The other Divisions advanced without meeting any opposition, and by evening the whole force, urged forward by their indefatigable leader, had covered forty kilometres towards the North. The failure to encounter any serious opposition from the Mozyrz Group began to cause the Marshal some anxiety. He feared a trap; and having advanced hitherto without any reserve, he now called in the 2nd Division to act in that capacity. On the next day, the 17th, the advance was continued without incident, and by dawn on the 18th, the 14th Division on the left was approaching Minsk. Just south of Mazowiecki, this Division struck the Soviet 16th Army in the flank, completely surprising the enemy. The 15th Polish Division covering Warsaw on the South-East took advantage of the confusion thus created, and attacked furiously towards the Warsaw–Minsk road. The 16th Army made no attempt to withstand this double pressure, and broke in disorder north-westwards.

While these events were developing on the left wing of the flank attack, the 21st Division in the centre, and the 1st Division on the right were pressing forward at full speed. By the evening of the 18th, the 21st Division had reached Sokolow, and the 1st was South of Drohiczyn. Now for the first time the Bolshevik High Command began to realize the significance of what was taking place, and this knowledge coincided with a report from the Commander of the 16th Army to the effect that he could not stop the retreat of his troops. From this moment onwards confusion took charge of Soviet strategy and tactics. The 16th Army was directed to retreat behind the Liwiec, a movement which it was well on the way to completing before the order to do so reached it. The 15th and 3rd Red Armies were instructed to hold the enemy at all costs until the scattered detachments of the 4th Army could be concentrated and brought back Eastwards. The 12th Army in the South was ordered to move North-West by forced marches and take Pilsudski in flank and rear. None of these orders was executed in the manner planned by the Russian High Command. The Commander of their 4th Army was out of touch with H.Q. and was caracoling in the midst of his widely scattered detachments far to the North-West of Warsaw. The 15th and 3rd Armies were attacked in flank by Pilsudski on the 20th August, and by the evening of the 21st his troops, assisted by the Warsaw garrison, were on the line Makow–Ostrow–Bielsk, driving the enemy in front of them. The 12th Soviet Army in the South stood still and did nothing. On the 22nd August the entire Polish army debouched along the line Ostroleka–Lomza–Bialystok, thus placing themselves athwart the line of retreat of the Russian 4th Army. The Red debacle was complete. Their 4th Army, hopelessly trapped, was forced over the Prussian

frontier and disarmed, the others reached Grodno in a lamentable state, but were not followed up by the Poles.

The Polish Victory

There were many circumstances which contributed to the success of Polish arms. The victory was essentially strategic rather than tactical; a victory forged by the brains and personality of a leader rather than a soldier's battle. In fact, there was comparatively little fighting. It is not easy in analysing the results of the battle to arrive at a correct estimate as to how far Polish successes were attributable to Russian error, rather than to Polish ability and valour. It is, however, just because those errors were so clear-cut, and the retribution they invoked so overwhelming, that a study of this battle offers a welcome mental stimulant against the depressing reading of those bull-headed encounters which characterized the Great War on the Western Front. The Russian strategy at Warsaw was undoubtedly faulty. Their leaders chose not one objective, but three. This resulted in causing a great distention of their front. The 4th Army, in trying to fulfil its mission of surrounding Warsaw from the North and West neither succeeded in its role, nor could it be brought to bear in time against the Polish counter-stroke. The 12th Soviet Army remained inactive when by a rapid thrust westwards it might have smothered Pilsudski's movement. Russian apologists have sought to explain these happenings on the grounds that the long succession of Polish reverses, and the consequent demoralization of their troops had created the conviction that Warsaw would be given up without a serious fight. Be that as it may, such an explanation cannot be made to fit the Russian inability to arrest Pilsudski's counter-stroke.

Various reasons have been given for this failure to stop the flank attack. The Mozyrz Group were blamed for not having reported the enemy's presence until 18th August; Budienny for not having co-operated against the flank when ordered to do so. These lapses, however, do but act as pointers towards a truer interpretation of the reasons for the Russian collapse. This appears to have been due to a combination of physical and psychological influences. The new-found liberty of Communism had imbued the Russian High Command with grandiose schemes which the inefficiency of their army prevented them from carrying out. Leaders of formations translated this idea of liberty into licence to obey or disobey orders as the spirit moved them. The Russian forces had been driven forward too fast towards Warsaw; cohesion waned; supply columns got left behind; little or no provision was made for flank protection South of the Brest–Litovsk–Warsaw

road. These circumstances combined to produce a situation in which the enemy, could they employ the terrible weapon of surprise, might hope to snatch victory from the flames. And that is what happened. Once the 16th Soviet Army " panicked," a general rot set in which could not be checked.

Despite the mistakes of the Red Army, Marshal Pilsudski's achievement ranks high amongst feats of generalship, but his methods of obtaining victory hardly conform with the precepts of military text-books. His plan succeeded for one reason only ; that was its singular audaciousness. The Marshal, in making his calculations, never for one moment supposed that the Mozyrz Group would put up such a slight resistance, nor did he suspect that the Russians had dispersed their forces so widely as the mission of their 4th Army compelled them to do. He believed, and states so in his memoirs, that the entire Soviet Western Army was concentrated before Warsaw. Against these forces he would have had available for his attack at the decisive time and place, not a superior but a vastly inferior force, which had first to disengage itself from the enemy, an operation usually considered as one of the most difficult in war. The concentration affected, there was no time for much rest or reorganization. Within a week the troops were sent forward upon what, by the rules of war, was a hazardous and forlorn enterprise. Once launched, however, the personality of the leader overwhelmed the infirmities of his war-worn soldiery. Motoring from dawn to dusk, backwards and forwards across the rear of his five Divisions, he urged them forward at a tremendous pace and sent them headlong into the hostile flank.

Time and surprise were the decisive factors. Time, because if Warsaw were unable to hold out until the flank attack had progressed, then the whole strategic plan would have come to naught. Thanks to the energy and ability of the Polish General Sosnkowski, aided by a slightly superior concentration of artillery, the Warsaw troops just kept the enemy at bay. The surprise of the flank attack was staggering because the Russians had failed to watch their southern flank. They relied too much on Budienny's cavalry to keep the southern Polish forces occupied, and thought the latter incapable of starting any new offensive. If Pilsudski's manœuvre was facilitated, as it undoubtedly was, by the errors and omissions of his opponents, these facts no more detract from the merits of his success than did similar ones dim the brilliance of some of the great Captains of the past. It was not the mistakes of Beaulieu and Wurmser which destroyed the Austrians in 1796, but the masterly resolution with which Napoleon exploited them. In the Valley campaign it was the military genius of Jackson which

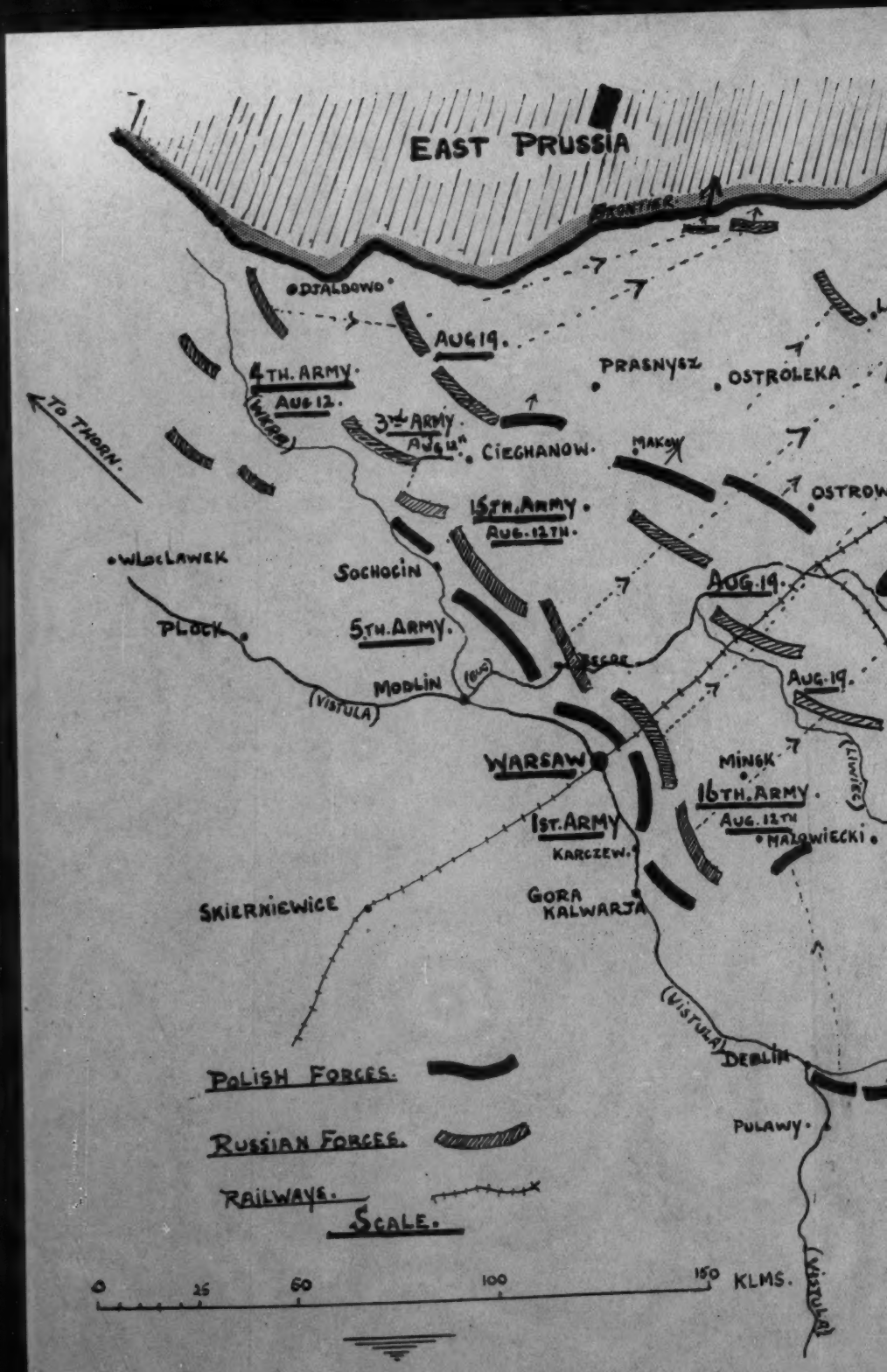
enabled him with 16,000 men to paralyse the movements of more than ten times that number of Federals. In both cases success resulted from the same mental process, a restless searching for the enemy's false step, ability in recognizing it, and audacity and speed in exploiting it. The platitude which declares that "it is easy to be wise after the event," bears a peculiar relationship to the study of military episodes. The student is often apt, in spite of himself, to belittle the achievements of great leaders when presented with a chronological account of all the phases of a battle and the movements of both sides. He is liable to forget that at the time those movements took place, the inevitable "fog of war" had spread its gloomy mantle between the contending parties. Its bewildering effects had to be overcome, and it was then that intellect and will were called into play, the first represented by insight and calculation, the second by energy, audacity and inflexible resolve. These qualities are found without exception in all those who have contributed masterpieces to the art of war.

The Principles of War

The strategy which Pilsudski employed serves well to illustrate, as also to confound, some of the principles of war. The Principle of Concentration, for example, in so far as it means the collecting of the greatest numerical force at the decisive time and place, can hardly be said to have been followed, but superior force does not necessarily lie in numbers or equipment. The counter-stroke is a good example of the concentration of superior force at the decisive time and place because of the presence there of a leader of commanding ability and resolution. With regard to the Principle of Offensive Action, our Field Service Regulations points out that such action should not be undertaken with inadequate means. Yet the Marshal's attack was, by the standards of modern warfare, rash in the extreme. The Principle of Surprise has seldom had a better exponent, though here again it is difficult to conceive a modern European army allowing itself to be beguiled so easily. The truth is that neither the Polish nor the Soviet Armies were modern in the accepted sense of the word. The fighting took on the complexion of a contest between Chinese "War Lords," rather than that of the war on the Western Front. Manœuvre took the place of long drawn-out battles of attrition. When an army was outnumbered or outmanœuvred, it retired or else surrendered.

Granted all this, however, the Polish leader's counter-stroke was a remarkable feat of arms. If he had luck, who can say that he did not deserve it, nor that he did not do a service to those who follow the profession of arms, by demonstrating that the art of war resembles the

other arts in that it is unlimited in scope and methods of interpretation. Such a revelation was badly needed coming as it did on the heels of the Great War wherein the military art had sunk to its lowest ebb. If his exploit may have caused the brow of doctrinaires to wear a frown, he proved once again, if proof be needed, the truth of those words in which our Field Service Regulations, Part III, expounds the doctrine of the counter-offensive.—" In practice, however, to achieve success in this type of battle demands the very highest qualities of judgement and resolution. The chief difficulty is that the enemy can, unfortunately, seldom be trusted to play the role assigned to him exactly as forecasted. He attacks at an unexpected place, at an unexpected time, or in unexpected strength; unless a commander has chosen his ground and planned his battle with great skill and holds to his original purpose of a counter-offensive with unfaltering resolution, he may find himself induced or forced to fight the battle on the enemy's plan rather than on his own. Three qualities are needed for success: skill to create the opportunity for the counter-stroke, which should come as a surprise; judgement to time its execution; and resolution to remain unshaken in purpose by the enemy's action."


EAST PRUSSIA
FRONTIER
DJALDOWO
AUG 19.
4TH. ARMY
AUG 12.
(NAREW)
3RD ARMY
AUG 12TH
CIECHANOW.
PRASNYSZ
OSTROLEKA
MAKOW
OSTROW
TO THORN.
15TH. ARMY
AUG. 12TH.
WLOCLAWEK
SOCHOCIN
AUG. 19.
PLOCK
5TH. ARMY.
MODLIN
(VISTULA)
(NAREW)
AUG. 19.
WARSAW
MINSK
(LIWIEC)
16TH. ARMY.
AUG. 12TH
MALOWIECKI
1ST. ARMY
KARCZEW.
SKIERNIEWICE
GORA KALWARJA
(VISTULA)
DEBLIN
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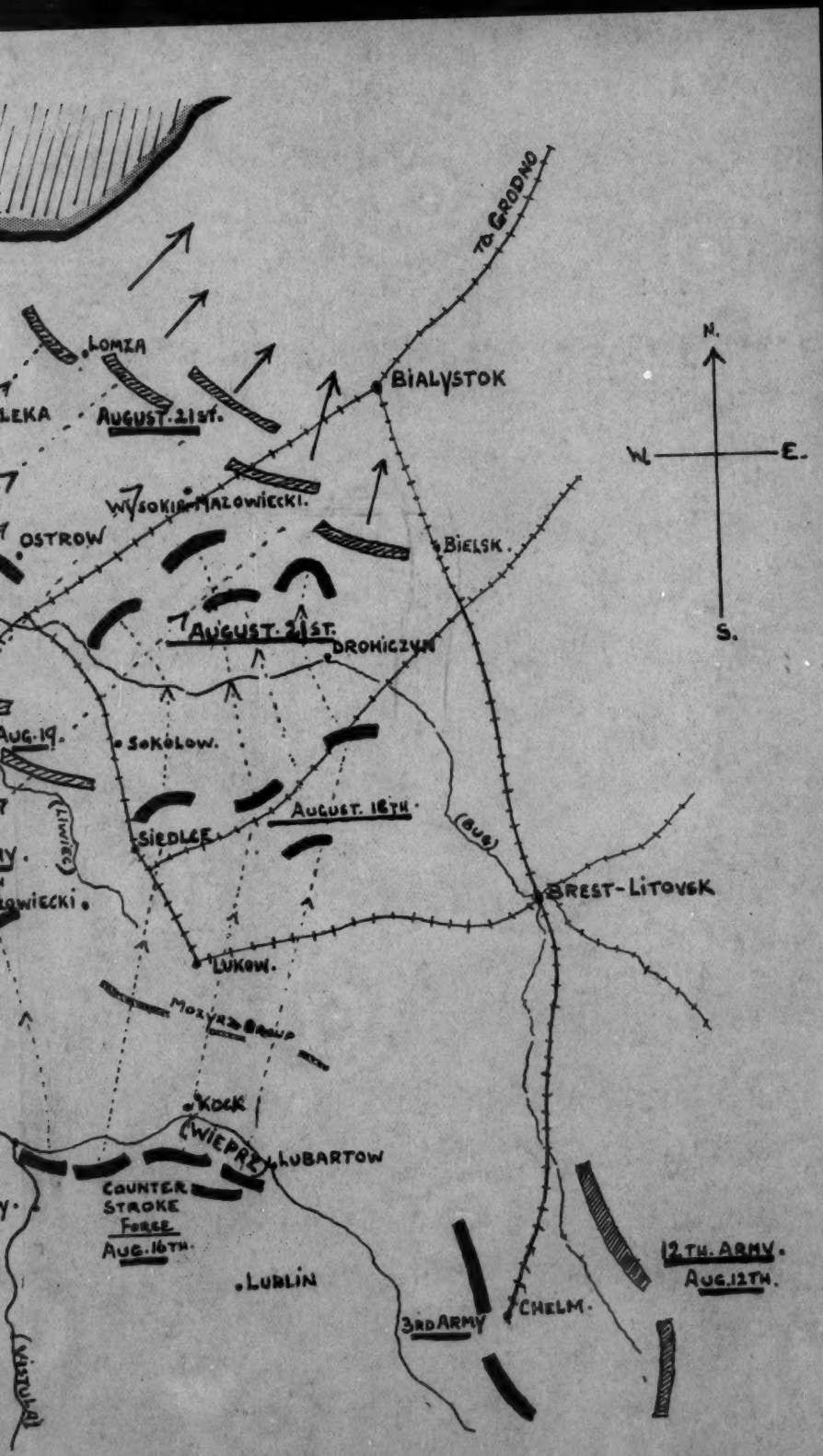
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SOKOLOW.
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SIEDLCE
(BUG)
BREST-LITOVSK
LUKOW.
KOCK
LUBARTOW
COUNTER STROKE FORCE AUG. 16TH.
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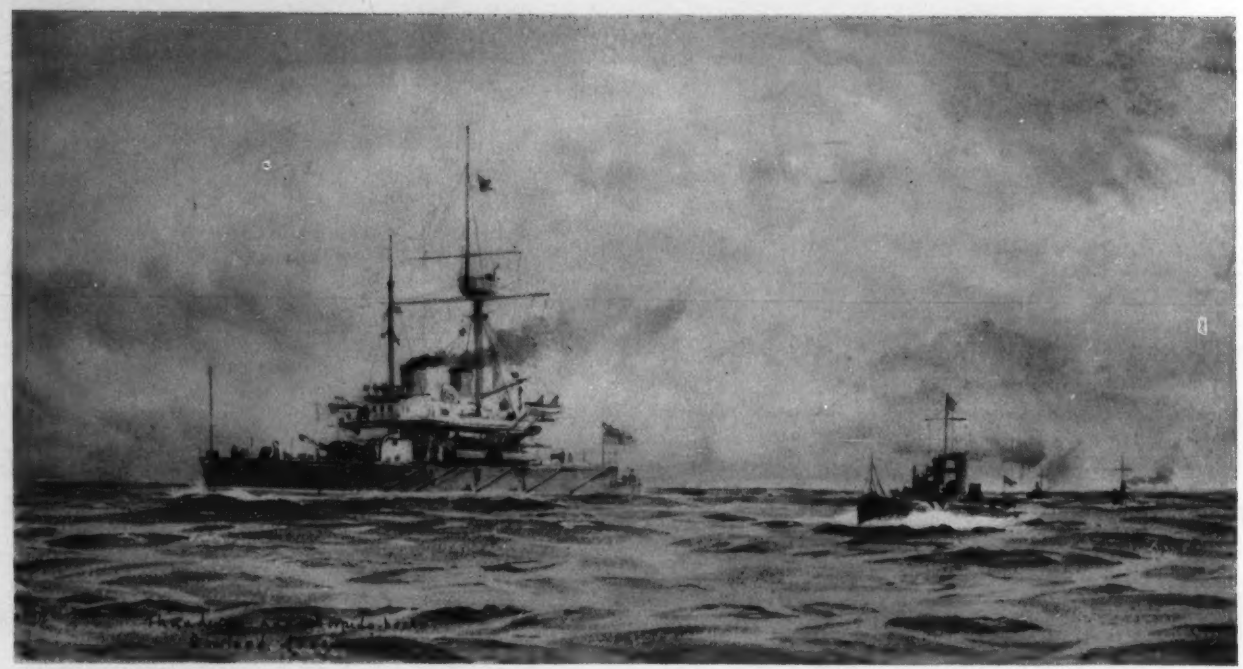


By courtesy of Messrs. W. H. Barrell, Ltd. Portsmouth

From the Watercolour by Lieutenant-Commander R. Langmaid, R.N.

THE MECHANIZATION OF THE NAVY

H.M.S. "THUNDERER"—AN EARLY 'MASTLESS' BATTLESHIP AND H.M.S. "LIGHTNING"—THE FIRST TORPEDO-BOAT

Reproduced from THE KING'S SHIPS THROUGH THE AGES

THE MECHANIZATION OF THE NAVY [1]

By Admiral Sir Reginald H. S. Bacon, K.C.B., K.C.V.O., D.S.O.

IT is indeed difficult to condense into the scope of a single article the improvements in the mechanisms of the Navy and their effects on strategy, tactics, and the personnel from the sail to the steam turbine, from the "Victory" to our latest battleship, from salt pork and lime juice to refrigerating machinery, from a quart of water a day per man to an unlimited supply of this necessity; and, further, to remark on how these changes have affected armament firms. The advent of steam, iron, and steel, and the growth in perfection of machinery are so intertwined that to treat them separately is impossible, yet to deal with them *en bloc* would result in confusion. I have therefore divided the years from 1815 to 1930 into three periods; the first ending at the year 1889, when the Naval Defence Act was voted and steel came into general use for ship construction; the second from that year to 1900, when long range shooting became a practical proposition; and the third period embracing subsequent years.

The Advent of Steam

On the day that the battle of Trafalgar was fought a boat propelled by a steam engine was ploughing the waters of the Clyde. Little did anyone in the Navy foresee the vast changes that would result in the Service from that microbic venture. The material of the Navy at that time, apart from some improvements in the sea-going and sailing qualities of the ships and their rigging, was in much the same condition as it had been two hundred years before in the reign of Queen Elizabeth. The sole machines carried on board our men-of-war were the capstan and bilge pump. The guns had undergone but slight improvement, the carronade with an embryo recoil-mounting had been introduced, percussion locks had taken the place of the slow-match, but that was all. Steam was, indeed, therefore an innovation.

For the next forty years the growth of steam as a means of progression was slow, unavoidably slow; since, not only was it necessary to design and construct engines of sufficient power to propel large ships, but the sole means then known of utilizing that power was by rotating

[1] A Special Exhibition depicting "The Mechanization of the Navy" will be showing in the R.U.S. Museum during the summer.—Editor.

paddle wheels. These excrescences were an abomination in a sailing ship and an absurdity in a fleet action, since the first broadside would most certainly have put those vulnerable projections out of action. It was, therefore, not until 1843 when the historic trial of the " Rattler," fitted with a screw propeller, and the " Alecto," a sister ship fitted with paddles, brought the advantages of the former home to the Admiralty, that the steam engine became a practical adjunct to the British Navy. Adjunct it was, since for the next thirty years sail power still remained the main means of propulsion for men-of-war, with steam only as an auxiliary for use in case of calm weather or foul winds in entering harbour.

As may well be imagined, so fundamental a change as that from sail to steam was not, in its transition stages, without its humorous side. One memorable incident is worthy of record. A Captain, accustomed all his life to a sailing ship, entered a harbour in a light wind under steam and sail. Having furled his sails, he and the crews of the other craft at anchor thought his ship bewitched when she careered about the anchorage with no sail set, until the Captain at last realized he had forgotten that the ship was fitted with engines.

Meanwhile vast improvements in machinery were taking place ashore. The smelting of iron went on apace ; machines were devised for shaping and boring hard metals ; the screw thread no longer had to be laboriously cut by hand, and armour protection for ships became a possibility. At first, attempts were made to bolt iron plates on to the sides of wooden line-of-battle ships, but these experiments proved that such a system was unsound as the extra weight strained the ribs, opened up the seams, and, generally, when the ship laboured in a seaway, racked a construction which had not been designed to stand the extra stresses brought about by so great an increase in weight. It became obvious that, if armouring was to become a practical proposition, the hulls of ships would have to be built specially to carry the weight ; this necessity compelled the construction of iron hulls for our men-of-war. It is not difficult to understand that such an innovation was stoutly resisted by most seamen. To them it seemed an elementary fact that wood would float but iron would not ; and, whereas a leak, specially if developed during an action, might cause quite a considerable amount of water to enter a wooden ship without incurring disaster, with an iron ship this would not be the case, and a moderate amount of water might cause the ship to founder. Science won the battle ; and, following up the experience gained with iron ships built for the Merchant Service, the " Warrior " and " Black Prince " were added to the list of the Navy. Calculation and experience soon showed that the use of iron in preference

to wood permitted the building of longer, and generally larger ships, since iron structures proved to be stronger than those of the same weight if made of wood.

The engines first mounted in our ships were indeed heavy and clumsy. Horizontal engines and jet condensers were installed as late as the " Agincourt " class. A low steam pressure only was used in the boilers, so that the engines worked as much on a vacuum as on steam pressure. It was hardly an exaggeration to say that, in those days, a hole on the top of a boiler could be stopped by covering it with a sack kept in place by a brick ! The jet condenser, whereby the salt water mixed directly with the feed, necessitated eternal chipping and cleaning of the boilers. It is little wonder that the economical speed of these battleships was about four knots ; and it was at this speed that the Channel Squadron usually cruised between Gibraltar and England.

Improvements in engine machinery followed quickly in the next twenty years, 1850 to 1870. The horizontal trunk engine and jet condenser gave way to vertical engines and surface condensers, and a still further step forward was made when compound engines were devised and fitted on board our ships. To show the revolution caused by this type of engine, it is only necessary to recall the fact that, in 1884 or thereabouts, from fifteen to thirty merchant vessels called daily at Malta for coal ; within a very few years this number had fallen to two or three. The economy effected by the compound engine allowed the Black Sea grain steamers to make the round trip from England to Odessa and back, and our Eastern trade to pass from Suez to England, without coaling en route. This revolution had its echo in the Navy, for it was no longer necessary to fit frigates and corvettes with sails ; with compound engines they were able to steam with certainty from one coaling station to another, whereas hitherto they had been unable to do without the assistance of their sails.

Iron and Steel

The year 1889 may be taken as a red letter year in the annals of the British Navy, for it was then that the Naval Defence Act took shape. By then construction of hulls and engines had advanced so greatly that, instead of steam being looked on as an auxiliary to sail, sail was considered to be unnecessary even as an adjunct to steam. Iron had completely ousted wood for the hulls of our ships. Iron armour was in general use for the protection of the gun positions and waterline. But, in turn, iron had to make way for steel ; for it was at this time that steel came to be used universally for hulls, and Krupps steel armour was

invented; both of these led to a considerable saving of weight in ship construction.

Let it here be remarked that the only reliable criterion in judging one warship by another is by a comparison of tonnage. On a given tonnage certain dispositions of guns, armour and motive power can be made according to the desire of the Board of Admiralty. If, on a given tonnage, additional speed, or gun power, or protection is desired, this can only be obtained by some sacrifice on the part of one of the other two. The comparative strength of a fighting ship therefore depends on her tonnage and not on any one of the above factors considered apart from the other two. In 1889, therefore, the Naval Constructor found himself in the happy position of having been given a present of several hundred tons in weight by the use of steel for hull construction and, also, by the adaptation of chilled steel to armour manufacture; so that, for a given tonnage, greater speed, protection, and armament could all be obtained to a degree that had hitherto been impossible.

During the previous thirty years the disposition of the armament in ships had likewise been undergoing a radical alteration. The old broadside disposition of medium-sized guns had gradually given way to the use of turrets. H.M.S. "Captain"—a ship deficient in stability and lost in the Bay of Biscay by capsizing under sail in a heavy squall—and the "Monarch" championed turret construction. These were quickly followed by the "Dreadnought (I)," which ship may be looked on as the projenitor of modern design. The "Admiral" class, commissioned in 1889, was an improvement on that of the "Dreadnought," for those ships were given a central battery of 6-in. guns in addition to two barbettes of two 12-in. guns each. They had, however, two grave defects: the forecastle was so low that they were unable to steam at speed in even a moderate sea, and their ends were unarmoured, so that even comparatively small damage in an action would inevitably have caused them to capsize. In the "Royal Sovereign" class—the best of the Naval Defence Act Battleships, both these defects were remedied, largely owing to the saving of weight due to the adoption of steel. This class of battleship remained for the next ten years fine models to guide capital ship construction.

Before the end of the Century, Naval Constructors received a further gift owing to the advances made in boiler design, and to the adoption of water tube boilers. These boilers reversed the principles on which the tank boilers had been designed by carrying the water where formerly the hot gasses passed and the hot gasses where the water previously had circulated. Two great advantages accrued: firstly, the saving of weight, since the volume of water carried in each boiler was consider-

ably less for a given heating surface ; and, secondly, the ability to raise steam in a quarter of the time that had been required in the case of the older boilers ; for, in the latter pattern, heat was distributed far more rapidly to all parts of the structure ; and, therefore, less stresses were produced by the rapid production of heat in the furnaces. Unfortunately the original Belleville water-tube boilers supplied to the Navy were badly manufactured. This design of boiler necessitated a number of inspection openings ; the covers of these were not bedded properly, consequently a considerable leakage of water constantly took place when under steam. This resulted in an undue expenditure of coal. These defects were soon remedied, but they caused a totally unreasonable vendetta to be waged against water-tube boilers in the House of Commons by the partisans of the old type. Considerable political pressure was brought to bear on the then First Lord, with the result that the supply of water-tube boilers was held up, a large sum of money was wasted, and the Navy was saddled with eighteen ships of reduced efficiency. But, as is ever the case with mechanism, if not with human beings, truth in the end prevailed and the water-tube boiler was adopted, but not until three years after it should have been fitted in all our new ships of war.

New Guns and Power Mountings

Up to the end of the XIXth Century the guns of the Navy were practically of the same pattern as those made of cast metal and used at the battle of Trafalgar. Such guns were, from the very method of their construction, unable to stand more than a very moderate chamber pressure ; their muzzle velocity and range were therefore correspondingly limited. A more scientific knowledge of metallurgy led to the disuse of castings, and a more complicated, but infinitely more efficient method of construction came into being. The improved guns were built up of coils shrunk over a central tube and also on to each other ; the compression thus obtained gave a greatly increased support to the chamber. Soon wire strip took the place of the majority of the coils, with the advantage that this strip could be tested throughout its whole length, and, further, it could be wound on at any desired tension. It was therefore possible by this means still further to reinforce the barrel and chamber.

Another radical improvement in ballistics was obtained by rifling the bore of the guns. In muzzle-loading guns this took the form of cutting grooves spirally in the bore in which travelled studs which protruded slightly from the projectiles. By this means, on firing, a rotary movement was imparted to a cylindrical instead of a spherical missile, and much heavier projectiles could be used and far greater steadiness in flight obtained. This method was still further improved

after breech-loading guns were adopted, for driving bands of a diameter equal to the bottom of the grooves were fixed to the projectile, these cut into the rifling and formed a gas check as well as a driving band.

The next great improvement came when breech-loading instead of muzzle-loading was adopted for all guns. So long as guns were loaded from the muzzle they had, in the case of broadside mountings, to be kept short to allow the recoil to bring the muzzle inside the port; or, in the case of turrets, to allow rammers to be worked either immediately inside the turrets or at a loading position through the deck in close proximity to the turret. Loading from the breech permitted guns to be designed of any length consistent with structural strength and rigidity.

With early breech-loading barbette guns, fixed loading positions were adhered to, but so much time was wasted in loading, owing to the necessity of training the turret from the firing position, which usually was approximately on the beam, to the fore and aft loading position, that an heroic solution was found by providing a working chamber which revolved with the turret and allowed the guns to be loaded while pointing in any direction. This reduced the time of loading from three and a half minutes to some thirty seconds.

Ever since its introduction in the "Thunderer,"[1] hydraulic power has been used for loading heavy guns and working the turrets. Only once has hydraulic power been departed from, namely, when electricity was experimented with in one of the later battle cruisers. Theoretically it seemed as if the latter power should be more efficient, but the reverse was proved to be the case, and electricity has never been reverted to for heavy turrets; its use has been restricted to the manipulation of smaller calibre guns.

Projectiles, needless to say, improved *pari passu* with gun design. The installation of armour necessitated the use of a projectile strong enough to pierce the iron. Krupp armour demanded a yet stronger construction, so projectiles with hardened points covered by soft iron caps (which at the moment of impact gave circumferential support to the rather brittle point) came into use. But the eternal war between armour and projectile continued, and probably will continue, for some years to come. Two classes of shell were evolved: one, powder-filled, called the "common" for use against unarmoured positions of a ship; the other, "armour piercing," for use primarily against armour. Both

[1] As a result of the successful application of hydraulic machinery to a Dutch gunboat, the "Hydra," built by Sir William Armstrong and Co. in 1873, the fore turret of the battleship "Thunderer" was similarly equipped and passed satisfactory trials in 1875.

could be filled with a high explosive; but, in the case of the armour piercing, the explosive had to be one which would not be detonated by the "set up" shock experienced when the velocity of the projectile was checked on striking the armour. The technical chemists solved this problem.

Propellants also improved with advances in the chemistry of explosives. The black powder of the 'seventies and 'eighties, with its rather haphazard time of ignition, was supplanted by prism powder with a central hole up each prism which allowed of a more uniform generation of gas. This, in turn, was superseded by cordite of a stick-like structure which led to a still greater uniformity of burning, moreover the rate of burning could be varied by alterations in the diameter of the sticks so as to suit the size of gun and to give any desired chamber pressure. Incidentally this form of propellant was destined to cause much trouble ten years later, owing to its tendency to disintegrate and ignite prematurely under the combined effects of age and heat.

The Torpedo and the Searchlight

Three other important additions to the naval armoury eventually vastly affected naval strategy and tactics. First amongst these must be counted the invention of the Whitehead torpedo. Early in the 'seventies Mr. Whitehead perfected a mechanism for automatically keeping a body when running submerged at a constant desired depth. The resulting torpedo started life with a wrought iron 14-in. cigar-shaped casing and a wrought iron air chamber, and a charge of black powder. By early in the XXth Century, it had attained a speed of twenty-six knots for a range of ten thousand yards, and a heavy charge of high explosive. The early torpedoes ran somewhat erratically, largely owing to their having only a small metacentric height which allowed them to heel and roll under disturbing influences; the horizontal rudders then developed a steering component in the vertical plane. In due course this was corrected by a gyroscopic attachment which kept the torpedo running in the direction in which it was fired. Compressed air was the motive power of the torpedo up to the end of the century. In order to obtain the full value of energy stored by the compression it was necessary, as the air expanded, to supply more heat than the surrounding sea water could satisfy; this led to artificial heat being provided and a considerable increase in range was effected. Finally, the application of the principles of the explosion engine was responsible for a spectacular increase in the range of this submerged terror.

The second improvement was the development of electrical energy on board men-of-war. Up to 1880 the only electrical appliances on

board our battleships were rather inefficient searchlights actuated by an alternating current and a Leclanché battery for firing the guns of a broadside simultaneously. Direct current electricity soon came into use for the searchlights, and brought about far greater efficiency owing to the formation of an intensely hot, and therefore highly luminous, crater in the positive carbon. The light from this concentrated focus was then projected in a parallel beam. Incandescent lighting for ships was first installed for trial in an Indian troopship; and this being favourably reported on, the "Colossus" was so fitted; after which the practice of fitting newly constructed ships with incandescent lighting became general. A good deal of trouble was at first encountered with the dynamo engines, especially in ships with low-pressure boilers, since at the necessary speed of revolution breakdowns constantly occurred in the heavy machinery necessitated by the low steam pressure. Faulty insulation also caused mishaps, and such telegraphs as were supplied for trial proved unreliable. Even in ships with moderate steam pressure breakdowns of the dynamo engines not infrequently occurred. Turbines were tried, but those installed had been put on the market before their mechanical construction had been fully tried out, and cases occurred of their bursting with effects not unlike those of a shrapnel shell. In fact, electricity had a hard uphill struggle before its reputation for reliability was fully established.

The torpedo boat was the third great innovation during the last fifteen years of the XIXth Century. These vessels were originally designed to carry torpedoes to within firing range of an enemy's ship when at anchor in a harbour. Gradually growing in size, they became capable of keeping the sea and working with the fleet. Then, in 1892, a much larger class—the destroyer—was ordered to be built. These latter, when first designed, were intended to counter the torpedo boat concentration in the northern French ports, but they soon took on far more important functions.

Strategical and Tactical Developments

So much for a brief account of the development of the material of the Navy up to 1900. It is as well to pause here and consider how strategy and tactics were effected by these developments. First of all we must appreciate that none of the improvements in guns, projectiles, or propellants was devised with the intention of increasing the range of the gun; all were devised to increase the penetrating power of the projectile. Before the beginning of the XXth Century it was not considered possible to increase the fighting range beyond 3,000 yards. Of course, the principles of strategy are immutable, but strategy in

application must vary with progress of material. The main effect of steam propulsion on strategy, and especially of ships fitted with compound engines, was the development of definite trade routes between various ports. This both complicated and also simplified protection: it complicated because raiders could inflict greater damage, since the merchant ships could be more easily located; and it simplified by gathering in the ships, more or less, under the wing of the protecting vessels. The net result was that we were forced to build a large number of cruisers to protect our trade routes, and we were also driven to install coaling stations at convenient places to refuel our merchant fleet and men-of-war. These coaling stations required both local and mobile defence, which in turn forced us to increase our fleets on the distant stations. The advent of torpedo craft necessitated very large alterations to our naval bases. The proximity of our South Coast to the French northern naval harbours caused us to build additional breakwaters at Portland and to construct a harbour at Dover. Malta and Gibraltar were also provided with protective moles against the torpedo craft based at Toulon and the African Coast.

It might be imagined that the advent of steam would have made a considerable alteration in the battle tactics of a fleet. This was not so. The fighting formation of the sailing fleet was single line ahead, and this remained the proper fighting formation for battle fleets during the whole of the XIXth Century. It is true that certain heresies were entertained late in that era, but the reason for the line ahead formation was as cogent in 1900 as in 1805; namely, that that formation allowed the maximum of uninterrupted fire to be delivered by a fleet of battleships. Nelson's formation at Trafalgar was, it is true, a departure from a strict line ahead formation, but the variation was dictated rather by the contempt he held for the partly trained crews of the allied fleet than by normally sound tactics. I remember the Admiral commanding the Channel Fleet in 1888 asking the Captains of the various ships for their opinion as to the best formation in which to fight an action. One officer replied that he considered the best to be " columns of sub-divisions in line ahead disposed quarterly." When asked for his reasons he replied, that this formation seemed to him " to be as good as any other." That an Admiral should have asked such a question, and that a Captain should have considered that " any formation would do," is evidence of the chaotic condition of tactical ideas prevalent at that time. But, in mitigation, it must be remembered that the effective battle range up to 1900 was considered to be only from 2,000 to 3,000 yards. The torpedo range of 800 yards was too short to affect the commencement of a battle. In fact, the use of the torpedo at this time was considered to be chiefly to prevent a ship being boarded, or to disable a ship which missed an

attempt to ram. It was generally expected that the line of battle would, as in the old days, break up into a series of ship duels, and that boarding was a probability. In fact, boarding stations formed part of the training of the crews, and cutlasses, boarding pikes and tomahawks were supplied for use during such an operation up to the year 1904.

Previous to 1900, wireless telegraphy had not advanced beyond the stage of being an interesting experiment. It is needless to expatiate on the help this invention has, since then, afforded both to strategy and tactics.

The "Dreadnought" Era

Such were the conditions in the Navy at the opening of the XXth Century, the first ten years of which were destined completely to revolutionize the Service. The most important factor in this was a development of long range fighting. Our heavy guns had for some years been able to fire with accuracy up to 10,000 yards; but, hitherto, it had generally been accepted that the difficulties of observation of fire rendered hitting hopeless at such ranges. We had advanced little beyond the times when the range of the target was obtained by measuring the angle subtended by the distance of such an object from the horizon as viewed from aloft and measured with a sextant. Range finders revolutionized this antiquated method, and salvo firing promised well to solve the difficulty of ranging by spotting the fall of the shell near the target, always provided that sufficient projectiles were available in each salvo, and that the time between the salvoes was not unduly delayed.

Several essential points emerged from these considerations. First it was necessary for each ship to have at least eight heavy guns, preferably ten, so that four salvoes of not less than four guns each could be fired each minute; and secondly, that all the other guns which were mounted in the ship were only for use in repelling an attack by small craft. It was found to be impossible efficiently to mix the calibre of guns in the primary armament as hitherto had been the fashion, since, at long ranges, the differences in "time of flight" and "fall of shot" of two or more patterns of projectiles led to confusion. It was undoubtedly better to concentrate all the weight available for the primary armament in one type of gun and mounting. Hence the "Dreadnought (II)" design with a primary armament of five turrets of two 12-in. guns each, and secondary guns as an anti-torpedo armament.

At the same time as the "Dreadnought (II)" was built, a new class of vessels, known as battle cruisers, was designed. Thoughtful naval officers contended that it was useless to employ vessels for scouting purposes which were unable to press home a reconnaissance. The cruisers hitherto built were able only to report the presence of a fleet,

but were powerless to determine its constitution. In order to be able to do this a speed superior to, and an armament commensurate with that of a battleship were required. Moreover, such ships could reinforce the van or rear of a fleet after an action had commenced. It was not anticipated that they would engage a battleship unless that ship were already engaged by a ship of her own calibre. Of course something had to be sacrificed in order to obtain the requisite superiority in speed; these ships, therefore, were more lightly armoured and carried fewer heavy guns; the calibre of these guns, however, was the same as those of the battleships. These ships in reality nullified the use of armoured cruisers in a battle fleet. It is rather extraordinary that this fact was not fully appreciated during the Great War. Before and after Jutland, the armoured cruisers were of nothing like the value to the Grand Fleet that they would have been on our trade routes; and, during the battle of Jutland, they were, in fact, more of a nuisance than a help, being neither strong enough to fight nor sufficiently fast to outsteam the battle fleet and take up their assigned stations during the run South. The loss of the "Defence," "Warrior" and "Black Prince" illustrates this point.

Director Firing and Modern Fire Control

The introduction of long-range firing completely altered the whole technique of fire control, and a further advance was brought about by the re-introduction of director firing in a modern form. By the time Jutland was fought, nearly all our battleships and battle cruisers were equipped with this system, whereby their guns were laid and fired from a single master-sight, instead of each gun having its own layer. In reality, the system differed but little in principle from the director firing practised in 1875, except that the director was now placed aloft, and electrical transmitters had so far improved in reliability that information could be transmitted to the turrets electrically instead of by voice pipe. But the technique of the system was vastly improved.

The Turbine

In the "Dreadnought (II)" design the turbine was first introduced as a means of propulsion for heavy ships. This radically affected the efficiency of our Navy. No ship of size had previously been so fitted. Prior to 1906 a full speed trial, or even a passage at high speed was a period of anxiety to the engine-room staff; and after such a trip the engines were certain to require a lengthy period of overhaul. In those days an engine-room of a man-of-war when a high-speed trial was in progress was a veritable inferno. The noise of the reciprocating machinery prevented any conversation being heard unless shouted

close to the ear. Hoses played water on all doubtful bearings, and the splash of the rotary cranks threw miniature shower baths in all directions. In fact, so wet was the place that the men tending the engines were usually clothed in oilskins. In November, 1905, six of our armoured cruisers left New York for Gibraltar steaming at high speed. Only three were able to complete the trip at 18.5 knots, and these were subsequently laid up for several weeks for extensive repairs to their machinery. The short stroke of the piston and connecting rods (owing to the necessity for keeping the engines of men-of-war below the armoured deck and practically below the water line) and the high number of revolutions this entailed during each of which many tons of weight had their direction of motion reversed, introduced stresses and wear unknown in merchant-ship machinery. In this latter service a long stroke and slow revolutions of the engines were in use since, the machinery could with safety be partially installed above water. On the other hand, in the engine-room of the " Dreadnought (II) " even when the ship was travelling at full speed, it was impossible to tell that the engines were not stationary and the ship in harbour, except by the positions of the needles of the several pressure gauges. The " Dreadnought " actually steamed to Trinidad and back—a total distance of some 14,000 miles—at 17 knots, and on arrival at Portsmouth not one single defect was found to exist in the main driving machinery. It is difficult for anyone who knew the Navy before 1906 not to appreciate the difficulties that would have faced Sir John Jellicoe had he during the Great War commanded ships with pre-" Dreadnought " machinery.

The Submarine

The Navy gave birth to another class of vessel in the year 1900, namely, the submarine boat. Submarines and submersibles had been manufactured, indeed, some were in commission in foreign navies, before this date ; but it was not until the petrol engine became an efficient means of propelling vessels that the submarine became a practical proposition. The steam engines hitherto employed introduced practical difficulties in the efficient working of the boats, chiefly owing to the length of time taken in submerging, the effect on the crew of the high temperatures of the boilers and engines and the large apertures that were necessary in the hull of the boat. All these militated against the success on service of steam-driven submarines. Petrol is by no means a desirable liquid to work with in a confined space, especially in places where ventilation is restricted and electric sparks a commonplace, but this danger had to be accepted for several years until the heavy oil engine had been satisfactorily developed. Propulsion when below water

and periscope vision presented no difficulties, and the advent of the gyro compass made navigation as simple as on board surface craft.

The ships of the "Dreadnought" and post-"Dreadnought" programme were fitted with numerous auxiliary appliances, such as hydraulic boat hoists which were ideal for hoisting boats in a seaway. Refrigerating rooms rendered the ships independent of constant provisioning, since fresh meat and vegetables could be carried for many weeks; and distilling machinery, which had long been fitted to steam ships, made them equally independent of fresh water supplies from the shore. Hence by the year 1914 ships had been evolved which could be relied on to be always ready for service as long as their fuel lasted.

Oil had gradually become an alternative to coal for stoking the boilers. At first it was used in conjunction with the ordinary fuel, being sprayed over the hot coal; then, finally, the boilers were fitted to burn oil only. The main advantage was simplicity and rapidity in fuelling the ships generally. The crews of small oil fuel ships, which during the War were frequently in harbour for a few hours only, could enjoy much longer periods of rest than would have been the case if they had had to undertake the arduous duty of coaling ship.

It was during the first ten or twelve years of the XXth Century that startling improvements were effected in the Whitehead torpedo. The increase in diameter from 18 to 21 in. enabled the explosive charge to be increased; and improvements in the engines added largely to its effective range. This additional range was responsible for new tactical problems; for example, when a single line of battleships engages a similar line of the enemy the ratio of ships length to blank spaces is roughly as 2 to 3; hence the chance of a torpedo hitting a ship in such a line is also as 2 is to 3. This fact endowed the torpedo with a certain influence over the tactics of a fleet. It imposes on the Commander-in-Chief the necessity for countering an attack if made by a wave, or several successive waves, of attack by the enemy's fast torpedo-carrying vessels. Superior speed allows an Admiral to choose the range best suited to his armament and the training of his crews, but the threat of the torpedo attack at times imposes on him the necessity for altering that range, however great may be the disadvantage of so doing. On the other hand, the range of modern fleet actions to a great extent rendered useless the torpedo armament carried on board large ships; and such armament, which occupies considerable space on a ship, can with advantage be dispensed with.

The developments in the torpedo, torpedo-carrying craft and blockade mines have altered the attributes of the capital ship. Whereas in the XIXth Century a battleship was, both an offensive and also a self-

defensive unit, in these days she lacks defensive powers, and other vessels have to supply this deficiency. A battlefleet is therefore not, as in old days, a self-supporting unit, but has for its own defence to be accompanied by a host of smaller vessels.

Specialist Personnel

The progression from sail to steam, from 1850 to 1940, naturally caused far-reaching changes in the nature of the personnel. A new Engineer and Stoker class had to be recruited to manage the machinery and effect repairs. Then the whole outlook of the officers and men also underwent a complete change. Instead of muscle and agility being the main desiderata in the men, and education and the three R's at a discount, physical qualities, other than health, have become of less value than technical education. The crews, in fact, have become engineers rather than seamen, that is in the sense that this term was applied to sailors of the old school. With the growth of education, naturally the conditions of life on board ship were bound to change, and more comfort and better living conditions generally became a prime necessity. If it were possible for an A.B. rated in 1938 to find himself on board a man-of-war of 1850, not only would he be utterly useless, but he would be thoroughly disgusted at the conditions of life he would there encounter; and, alternatively, if a seaman of the old school were to find himself on board a modern man-of-war, he again would be largely useless and quite aghast at the refined manners and customs of his shipmates.

The effect these changes wrought on the officers of the Fleet is no less marked. Nelson's dictum that "no Captain could do wrong who placed his ship alongside one of the enemy" epitomizes the requirements of a naval officer in 1805. The requirements then were physical rather than mental. In these days it is difficult to over-estimate the mental equipment desirable in an officer, especially an Admiral. The belief, sound enough in bygone days, that gallantry only was required to win an action is, in these days, a pernicious doctrine. Now no physical virtue can override the necessity for an Admiral possessing a thorough knowledge of his profession and of the functions of all vessels under his command in war-time. The unobtrusiveness of knowledge must, in modern times, supplant the pageantry of personal gallantry and achievement.

Commercial Aspects

The effect of progress in armaments on private firms has led to the sinking of a vast quantity of capital in machinery and plant in order to

cope with Admiralty requirements. The possession of this plant has, in turn, led to our Country receiving valuable orders from abroad for steel, steel products, and for ships and their armaments to an amount which may be fairly estimated as being, before the war, several millions annually. The orders from the Admiralty were of the greatest value to the armament firms in that they provided a more or less constant annual amount of work which went far to reduce overhead charges; they were therefore able to tender favourably in the world markets. Whenever orders for naval armaments have been unduly restricted, an immediate repercussion has been felt throughout the country; and unemployment, poverty and suffering have resulted. The old slogan that "armaments are unproductive" and that therefore money spent on them was wasted, is an absurdity. No money that is spent can be looked on as "productive" unless it supplies directly or indirectly necessities for the life and health of the community. All other expenditure, whether for home or foreign consumption, is quite as unproductive as that spent on armaments. When our country possessed a powerful Navy we were respected and looked up to by all. So far as the smaller nations were concerned this respect led to confidence and in turn confidence led to the placing of commercial orders since delivery was guaranteed and stability in commerce assured. Another point in favour of spending money on armaments is that such expenditure causes money to circulate among some seventy different trades, and since money that is spent changes hands on the average several times in the course of the year, armament orders are of as great a value to the Country as money spent on motor car factories or any other of the hundreds of luxuries which do not effect the life and health of the nation.

The steady progress which has changed the whole nature of our Navy has not been due to the labours and brains of a few men only. Men of all nations have contributed to the scientific and engineering knowledge that has been necessary to effect this transformation. Naturally certain names spring to the mind in this connection; but it would be inviduous to particularize, and by so doing assign to them credit which, in reality, should be largely shared by the more obscure workers who helped to bring their labours to a satisfactory conclusion.

Conclusion

Finally, all the above changes in the Navy are entirely due to the outcome of scientific research and inventions, and improvements in machinery. Not only have these changes altered the whole of the Navy, its strategy and tactics, but they have, by increasing the complexity of

our ships and from the more accurate knowledge required in tactical dispositions, altered completely the educational requirements of the officers and men who man the mighty vessels of modern naval warfare. But in congratulating ourselves on this progress and on the efficiency of our fleet, let us fully recognize that improvement is not always an advantage, and that modern machinery has rendered our country far less secure against foreign aggression than it was when defended by our old, poorly educated but gallant seamen and the wooden walls of our old-time sailing ships.

MODERN WAR AND ITS MAZE OF MACHINES

By Brigadier B. T. Wilson, D.S.O., *p.s.c.*
Commander, Nowshera Brigade.

CYNICAL writers, who have not usually had the direction of armies entrusted to them, always deplore the stupidity of soldiers and prophesy almost gleefully that the next war will surely begin with much the same " opening chorus " as the last one. The acceleration of military thought has indeed at times been slow, and the last century well reveals the stagnation which in Europe descended on the art of war after the Napoleonic wars.

The Crimea added little splendour to the annals of generalship, which was far better understood in 1815 than it was in 1852 and, although 1870 was remarkable for the perfection of the German mobilization arrangements and the novel use of railways for the rapid concentration of immense German armies, the tactical handling of troops on the battlefield was often faulty and murderous. The researches of Liddell-Hart and Fuller have shown with some truth that the determined quickness of the American mind in 1862–1865 enabled a nation, by nature uninterested in war, to develop by long and dire experience of fighting more tactical skill in battle than was produced in the struggle of 1870 or even during 1914–1918.

There were, however, reasons for slow development in methods of war during the last century. After 1815 and twenty years of almost continuous campaigns, an exhausted and for the most part illiterate Europe was only too content to lose interest in warfare. For half a century, Europe was immersed in national and industrial revolutions and, as far as this country was concerned, the Duke of Wellington was personally at pains to discourage any attempt to keep the British Army up to date.

Right up to the outbreak of the Great War the ordering of armies and the direction of military affairs were, in Europe at least, left severely to professional soldiers, on whom the striking German successes in the Franco-German War left a far more permanent impression than any other war of modern times, even the Russo-Japanese War—actually so full of clues to the future and so pleasing to historians, who always conceitedly deplore that no one ever reads history. For better or for worse, then, German war fashions, with their exceedingly lively French

counterparts, largely coloured the art of war in Europe right up to 1914 with results that still stagger the popular mind.

The shorter but far intenser struggle of 1914–1918 came at a time when compulsory education, by spreading knowledge, and modern invention, by conquering space, was making the world smaller and more intelligible to the individual man. The process has continued, so that the various peoples of to-day have had thrust upon them an almost personal interest in the stupendous events of 1914. Over and above this, a bad peace treaty, new forms of Government and totally changed economic conditions have thrown the world into a state of such inequilibrium that every thinking man has good reason to consider the possible forms of a future war, in which he personally may one day be intimately concerned.

This present-day study of war will inevitably lead to developments in methods of destruction far beyond the peace-time progress of the past. In fact armed forces, which stagnate now, will run every chance of a speedy " blackout " at the very outset of a future struggle. It may be said, therefore, with some confidence that the next war will not start where 1914–1918 left off. How then is a war to be waged and won nowadays ? The problem is exercising many able minds in Europe with patently feverish effects. Many would like to wage war now, could they but see a method of doing it, which was quick and cheap and which did not involve the sacrifice of millions of lives in the manner of 1914–1918. They still stick in the gorge of Governments and dictators—those millions of dead. The memory of them must fade from the minds of the wide-awake peoples of Europe before the dogs of war can be loosed again with impunity. Even if the recollection of it all had passed away from the multitude, only a madman would launch a nation into war without a better recipe for victory than that which willy-nilly had to serve in 1914–1918. The selection of better methods of war is complicated by a maze of new mechanism and a morass of muddled ideas, which make it extremely difficult to fix the relative importance of air, land and sea warfare.

"All-in" Warfare

The background of any conception of future fighting is the now clear underlying fact that in the savage struggle to win, war will be as relentless and as frightful as the ingenuity of man can make it. If any advantage seems likely to result from the bombing of great cities or from starving their inhabitants, that advantage will inevitably be taken. If chemical warfare offers prospects of speedy victory, chemicals will most certainly be used. It should be noted *en passant* that chemical

warfare, *per se*, is relatively not at all inhumane, and that it is essentially an offensive weapon. This being so, it is most necessary to be in a position to use it offensively if other belligerents do so and not to be content merely to study defence against it. After the experience of 1914–1918 and its aftermath of misery, it is easy to predict that even victory is likely to produce much national misery, whilst defeat would bring an infinity of ruin. At the present day a nation would stop at nothing in order to be in a position to dictate terms to its enemy. " All-in " war will be the order of the day, and every man, woman and child of the warring nations will be concerned in it.

This inevitable " all-in " aspect of future fighting has led many writers to propound the doctrine that air power is the short cut to victory, and that land warfare has lost its importance. They argue with some plausibility that aircraft alone have now the power immediately to attack an objective with explosives, fire and chemicals. Therefore myriads of aircraft launched at the right moment against an enemy's cities and factories will paralyze him at the very outset and force the conclusion of peace. A " fool's mate " will be thrust upon the enemy at the very start of the game. It is unnecessary here to elaborate the engaging possibilities of destroying an enemy which the possession of myriads of aircraft seems at first sight to make feasible. They have been given with admirable dramatic effect in many publications by many writers, some for patriotic reasons, some with very large axes to grind. It is important, however, to accept the fact that air power has become such a tremendous factor in war that no mental picture of future land war can be worth a straw, until some well-considered judgment has been reached as to the war value of the air armadas which most nations are hastily constructing. Will they in effect so dominate the land and sea that armies and navies will really be only the minor trappings of the ghastly splendours of " all-in " war ? If so, war effort may be concentrated on the requirements of aerial warfare and comparatively little else.

In considering the relative war value of air armadas *vis-a-vis* armies and navies, it must be remembered that there have been great innovations in warfare quite constantly in the history of mankind, and that these innovations have always moved quite slowly into the perspective of the historical picture. This slowness in the advance of new technique is by no means entirely due to the reluctance of fighting men to face the mental strain which new methods obviously entail. Treasuries are always reluctant to expend money even on old and proved war material—let alone new and untried devices. Moreover teaching a whole service the use of even one new tool is not only an expensive, but also a long and

laborious task most unsettling to the ranks that have to use it. Whilst the long task of training is in progress, the service in question has still to be ready to fight and probably does fight—in some out of the way corner of the world. And new tools of great moment like aircraft require men of real genius to appreciate how to use them in the right manner and at the right time. That is why war is an art and not an exact science. A new school of painting cannot be evolved in a few months, it may take a decade and even then may prove vastly unsatisfying to posterity. It is precisely the same with a new tendency in the art of war.

Air Bombardment

Newton pointed out many years ago in his philosophy of mechanics that to every action, there is an equal and contrary reaction. This law applies with special force to a warlike innovation; it rarely happens that a new military device or technique sweeps the board. On the other hand new weapons have often lulled their owners into a feeling of superiority which has been rudely shattered on the battlefield. The reaction to a new system of war is immediate; the instinct of self-preservation at once demands an appropriate remedy. This is duly supplied and the development of the new system becomes balanced and gradual. Any endeavour to place air power into its correct perspective must, however, take careful note of the fact that the conquest of the air, though yet imperfect, is perhaps the most astounding accomplishment in the history of war. The effect of this conquest on war technique has already been tremendous, but it has clearly as yet by no means reached its zenith. The defensive reactions to air attack are so far difficult to sum up; outwardly they seem unimpressive by comparison with the exciting cause—the still almost miraculous power of flight. Until the effect of real masses of bombing aircraft has been tried in actual war, the probable exact result cannot be gauged. Affairs of a few hundred aircraft as used, or misused, in Spain at the present moment provide opportunity for the wildest deductions. There are however obvious difficulties in handling swarms of aircraft of any kind; let alone bombing aircraft which are nasty lethal things to fly about in, as any pilot with 1,000 lbs. of T.N.T. under his tail knows only too well.

The deployment of any large number of military machines whether on land or sea or in the air is bound to be a formidable task. One of Lord Jellicoe's haunting preoccupations in the days which preceded the battle of Jutland, was to figure out the best method for setting his huge fleet into position for the best development of its enormous volume of fire. Almost every day the extension of armies from column of approach

into line of battle becomes a more intricate problem. It is almost certain that an air commander charged with the deployment of many hundreds of aircraft, will have similar difficulties to overcome. Machines which move at 200–300 miles per hour and yet cannot, when air borne, for a moment stand still are difficult customers to handle in large masses. Once a large mass is launched on its mission, it will rarely be possible materially to alter its orders, until it returns to a multitude of aerodromes several hours later. Appalling blunders and dire confusion will often occur and great losses will be the result of them. Like animals possessed of great speed, fast moving mechanism directed by man tends to be highly strung and apprehensive. The boldest individual pilot will be quite a different person when in charge of massed aircraft to what he would be if he were flying alone. The leaders of aircraft masses will have such responsibilities to bear that it is permissible to doubt whether they will prove equal to the task, till airmen have acquired far more experience of air combat than they possess at present. At the present day, massed aircraft would be achieving a fine performance if they succeeded in arriving over an objective in column of scores of successive squadrons. Against an attack on such a narrow front opposing aircraft and anti-aircraft guns would cause great losses. *Cæteris paribus*, it is probable that an aerial combat of this kind would result in terrific air casualties on both sides, but the damage inflicted down below would almost certainly prove to be vastly disappointing to those who believe that aircraft alone will be able to win a decisive war. On the other hand aircraft capable of use in this manner are so obviously of supreme importance in war, that no country desiring to survive can possibly afford not to possess as many aircraft as its most probable enemy. Thus one air force will tend to cancel out that of its rival, whether they attack with H.E. or chemicals or incendiary bombs.

Of course it is conceivable that a Power confident in its air strength might, without declaration of war, make a surprise attack with air masses on vital enemy targets. Apart from the ethics of such a course of action and bearing in mind that ethics still have enormous influence on mankind, success in this kind of surprise attack still depends on too many unknown factors really to be an attractive plan of action, even to the boldest dictator. Such war experience as is available shows that many hundred thousand tons of high explosive and chemical can be poured into quite a small town without making it impossible to inhabit. Thousands of soldiers, for instance, lived not too uncomfortably in Ypres throughout all the bombardments to which it was subjected, including quite a formidable mustard gas bombardment. Of course many of them were killed or gassed, but it was still possible to live there and carry on the war.

A really great nation like ours will accept huge losses with the greatest equanimity when the alternative is defeat and national ruin. *Noblesse oblige.* The courage and resource of the inhabitants of Tokyo when that city was laid waste by earthquake is typical of what may legitimately be expected of a great nation in calamity—not the squealing panic which the " airmonger " so loves to describe. If adequate instruction in counter measures is given to the inhabitants, it is not by any means certain that a heavy aerial bombardment of London or Paris would cause either decisive damage or even cause much panic amongst their inhabitants.

It can of course be argued that the countless activities of a great city will be impossible in the face of a heavy and continuous bombardment. We are assured that the breakdown of communications and the failure of all means of transport will paralyse the nerve centre of the defence and by holding up even the distribution of food will bring starvation to an already maimed and maddened population. Persons who argue like this have no comprehension of the exigent demands of war or of the grandeurs to which it raises ordinary humanity. They would do better to stress the fact that during a future war all but the essential services, required for the defeat of the enemy, will immediately cease to be of much importance. Cities may in the future be bombed, burnt and gassed, but somehow or other the necessary work will be carried on—that is quite certain. In a properly organized capital city quite a few men will be able to control affairs and direct the war, and it is quite conceivable that Central London in a future war would be comparatively empty of inhabitants. Business would certainly not be as usual. After all, very few people who work in Central London actually sleep there, and their removal or absence could be arranged.

Public writers on the menace of the air, if they really wish to help matters, must give up defeatist talk about inevitable surrender. Surrender will not be a practical proposition. But the people must at all costs be got to realize that an air attack on cities will be a shattering experience and be made to understand before the blow falls that somehow or other essential services have got to be carried on. If they don't grasp this in peace-time, they will have to do so with the more discomfort in war, for no great people is going to allow itself to be " foolsmated " as the result of a surprise aerial bombardment. The national navies, armies and air forces will not be quartered in the great cities, and until they have been defeated no enemy can set foot in the land, even if it has been devastated by air attack. There will be far too much at stake for any government or any leader to sue for peace because of early reverses and people who clamour for surrender will certainly be suppressed at

once, if necessary by force of arms, or " a whiff of grape shot." Let there be no misunderstanding in anybody's mind about that.

The probability of docks, railways and roads being wrecked by air attack, thus producing almost immediate starvation for the country, is a trump card of the " all-by-air " alarmist. Here again this trump card is of doubtful value, for it is by no means certain that decisive damage would result or that starvation would in fact take place.

England from its geographical position is admittedly especially vulnerable to attack by bombing aircraft from the Continent, but it has many harbours and admirable networks of road and rail communications. If adequate food reserves are held and proper plans are made beforehand, a London cleared for action could be sufficiently supplied for surprisingly effective action against air attack. Without a doubt, therefore, any power which attempts the air-bombing of England, on a big scale, will suffer huge losses in the process, without any cast iron certainty of early victory as a result. So much so that foreign statesmen, who are attracted by the idea of air invasion, may well think twice about risking their laboriously acquired air fleets on so doubtful an adventure.

They may of course be led astray in their war appreciations, as they have been in the past, by thinking that what appears to be a current idea in this country is accepted as absolute truth by the people. The thought that a few thousand aircraft with bombs and chemicals might really solve the age-long problems of defeating England must be like a draught of strong wine to young and ambitious governments on the Continent. Herein lies a real danger, for war is apt to start from mistakes of this kind. A great people intoxicated with an idea might perpetrate harm which would require a deal of bother to put right. There is no doubt that extremely able measures are being taken to deal with the whole problem of the possible air invasion of this country, but if they are kept too secret from ordinary citizens and from the outer world, there is a danger that both parties may arrive at disastrously incorrect conclusions on the whole business.

Another aspect of aerial warfare which generally receives scant consideration when masses of aircraft are in question, is the matter of pilots. Although almost any healthy young man with good nerves and eyesight can soon learn to fly an aeroplane, it takes a long time to teach him to fight and bomb from the air, especially in large masses. This is a strong reason for not risking the loss of a very large number of trained pilots and air ratings in a headlong and doubtful enterprise at the very outset of a war.

To sum up the above arguments, it may be said that masses of bombing aircraft acting alone may well produce widespread destruction

and much panic, but there is nothing to show that either the damage or the panic will be of decisive importance. If they are not of decisive importance, the job of winning the war will hardly have begun, for well-guarded sea and land frontiers will still have to be crossed and the hostile country will still remain to be occupied. The casualties incurred on such a venture might be very large and might result in a loss of air power in other places at a time when land or sea forces were engaged in vital combat, for which every available aircraft might be necessary for obtaining victory. Air power is likely to be so immensely essential in sea and land fighting that huge air masses are not lightly to be risked at the outset of a great war. It is when a nation is exhausted by the struggle and tottering to its ruin that masses of aircraft will possess the power summarily to end the agony by independent air action. Until some such crisis of a war presents itself, air power is likely to be used for the most part in co-operation with the older Services to make the offensive possible in operations which would otherwise not be practicable.

The only conclusion which can yet derive from a careful consideration of the facts of air fighting is that air power can no more lead to a decision in an " all-in " war than sea power alone. There will always have to be fighting on land before victory can be obtained. That most countries have decided similarly is shown by the enormous armies and large fleets that Europe maintains and increases at the present day. Having decided that land fighting even in " all-in " war will continue to be essential for decisive victory, it is desirable to try and discover the best method of doing it.

Offensive and Defensive

Will leaders of armies preach the offensive and nothing but the offensive or will they be content with a more cautious form of strategy? We do not hear so much about the offensive nowadays. Before 1914, and even during the Great War anyone who ventured to think that the attack might be highly disadvantageous was hardly a man—much less a soldier. Whew! What it cost—that doctrine of the offensive at all costs. In the actual event, the only offensives which looked like being cheap and decisive were those which were conceived on a big scale and had a large element of surprise in them—the German drive through Belgium in 1914 is an example. Offensives not relying on surprise and not on a big scale were at best undertaken for defensive reasons or at worst were just costly mistakes. An initial offensive suitably mounted, combined with surprise, might still achieve great results and is specially to be feared. To guard against surprise most European Powers have spent, or will be spending, a great deal of money on the provision of

precisely those defensive systems of field works organized in depth which proved so devastatingly efficient in 1914–1918. The Maginot Line on the eastern frontier of France, for instance, is believed to have cost over thirty million pounds sterling already, and will cover the frontier from the North Sea to Switzerland.

As European armies are mostly still organized on a conscription basis and tend in consequence to be exceedingly large, and as frontier defences will almost assuredly be organized much in the Maginot Line fashion, a belligerent who wishes at once to take the offensive will probably be faced with the breaking of an up-to-date Hindenburg Line at the very beginning of the campaign. In other words, he is faced with the same type of siege operation which so often confronted the various commanders in the Great War and which so often proved so costly and so unsuccessful. Even if a frontier can be crossed on a wide front without much loss by means of a surprise assault employing up-to-date methods on a large scale, the successful attack must be able to move with great speed, otherwise it will assuredly run up against more field defences further on which will again require siege operations to defeat them. In fact, the defensive power of modern weapons is so great that speed of movement is more important than it ever has been; it is essential to take advantage of the literally fleeting moments when an enemy, surprised by an overwhelming assault of a novel character, has lost his balance, and with it his grip of the situation.

A modern army, therefore, if it is to have any prospect of gaining a decision rapidly, must possess the battering power of a siege train and the speed of movement which large forces of cavalry possessed before the introduction of weapons of precision. These two requirements are so incompatible and so difficult to fulfil that there are strong grounds for arguing that in a future war it will be impracticable to gain a decision rapidly, and that "victory without tears" is an impossibility. From the point of view of humanity, it may be all to the good that future warfare is probably bound to be such a bloody business, for governments obviously hesitate to embark on it. The effect of beautifully fought short campaigns is often ephemeral. Indeed, people who rage so furiously about the slaughter of the late war and the stupidity of all the Generals concerned in it, are apt to lose sight of the fact that the wars waged by the great captains of history were apt to run out for the best part of a lifetime, and were in the end relatively just as costly to the countries engaged in them as the Great War. It is quite open to question whether magnificent campaigns which continue on and off for a generation are any better than a war of exhaustion which lasts for four years. Statesmen of to-day are like mediæval chemists searching for the

philosopher's stone if they imagine that any conceivable system of warfare will provide victory in a great war without terrible suffering and tribulation. Military writers do a great deal of harm by urging or implying that there are short cuts to victory in wars between well-organized, great and vigorous peoples. History at any rate seldom provides examples of easy campaigns; if they do happen, they are generally but a prelude to a further series.

Returning now to the point that a modern army of any value must possess the battering power of an immense siege train combined with the mobility of a Napoleonic host, it becomes necessary to ponder on the practical means of fulfilling these two activities. The ingenuity of man has, during the last thirty years, provided a multitude of engines and machines which, if they could only be regimented in the correct manner, seem as though they ought to provide a solution of the problem.

Supporting Fire

Emerson says in his essay on Self Reliance: "It may be a question whether machinery does not encumber. . . . We reckoned the improvements of the art of war among the triumphs of science and yet Napoleon conquered Europe by the bivouac, which consisted of falling back on naked valour and disencumbering it of all aids." The quotation prompts thought. The days of naked valour and the dropping of all aids had actually long since departed, even in Napoleon's day, but he did take a very complicated system of fighting, select from it the essentials and simplify the art of winning battles. This process is sadly required at the present day, and it is worth while noting that the first need of present-day warfare is simplification.

Now, if they can only be studied with vision and understood aright, the later tendencies of fighting in France in 1917–1918 must reveal the essence of future success in war. The feature of those battlefields was the fire of artillery and machine guns. Success was only obtained in the attack by the surprise fire of a huge mass of artillery. This surprise fire was made possible by "surveying" the guns on to their targets and by the complete absence of preliminary bombardments. This overwhelming surprise fire of artillery was the essential basis of the novel tank attack at Cambrai in November, 1917, of the German well-nigh victorious movement in March, 1918, and of the "Black Day" of the German Army on 8th August, 1918. It is to be specially noted that the German success on 21st March, 1918, did not rely on masses of tanks: the prime main-spring of the advance was overwhelming and unexpected artillery fire—not tanks.[1]

[1] See "A New Deal in Tactics," by Brigadier M. N. Macleod, in the JOURNAL of November, 1935, p. 731.

Now although most of the British artillery of 1918 vanished with the advent of peace, just as most of our aircraft had nearly vanished until we realized that we were asking for sudden calamity, if it comes to fighting again in a war in Europe, some extremely powerful means of supporting attacks will clearly be required. Nothing else will make forward movement possible. Without it armoured vehicles will be knocked out just as certainly by anti-tank guns and artillery as infantry were mown down by machine guns and artillery in 1914–1918.

In the siege warfare conditions which developed in the Great War, the supporting fire necessary for any hope of success was produced by a stupendous mass of artillery, sometimes as dense as a gun to every five or six yards of front attacked. The resulting covering fire was not apt to be effective until the most deliberate and systematic methods of directing it had been evolved. Even then successful attacks were often held up directly they got beyond the range of the preliminary artillery layout owing to the difficulty of moving forward the batteries and of re-aligning them on new targets. For modern conditions, therefore, artillery fire has the limitation that it is so slow and cumbersome to handle in comparison with the handiness and the deadly accuracy of machine guns.

This being so, it is almost certain that supporting fire and smoke screens beyond the range of the opening artillery bombardment will tend more and more to be put down by large numbers of bombing aircraft, thousands of which will be at the disposal of future belligerents. At the present time the use of bombing aircraft for the close support of advancing ground formations has not been as fully explored as the greatly increased accuracy of bombing aircraft seems to deserve. If artillery aircraft can direct artillery on to a target, there seems no reason why they should not do the same thing with bombing aircraft. Unless aircraft are used to help forward the troops somewhat in this manner, there will be waste of bombing aircraft just as there was in the Great War, when they were not so efficient as they are now, and when their use was not understood. Artillery and bombing aircraft should obviously be closely co-ordinated and the problem requires study.

Light Infantry

Having stressed the importance of providing formidable and accurate supporting fire, it is possible to imagine with more hopefulness that tanks, armoured carriers and infantry may be able to overrun the defence and to capture the ground essential for victory. Even with a sufficiency of heavy and accurate supporting fire it is essential for an

assault to move fast and to be protected in its movement even if it is to cross the fatal quarter of a mile or far less, in which so many attacks withered away in 1914–1918.

At the present day, with far less support of any kind than was available in 1917–1918, infantry battalions are still taught and still manœuvre on the supposition that they will be able to advance on their feet to the assault of unbroken enemy infantry of equal calibre in a defensive position supported by other arms.[1] Would it not be more honest and far more likely to lead to a solution of the problem of the attack if it was at last admitted that foot soldiers cannot expect to advance to the assault of unbroken hostile infantry except when it is certain that the enemy small-arms fire at decisive ranges will be negligible. If the fact is accepted, we can at once cut away a lot of dead wood which is certainly " encumbering " the problem.

We can say at once and unashamedly that what we want is a light infantry soldier who will not be called upon to assault a defensive position on his feet, but merely to occupy it speedily when it has been made untenable for the enemy and be prepared to defend it. If this is accepted, the need for a close support gun or mortar with the battalion to enable attacking riflemen to get forward, at once disappears. As a close support gun or mortar tends to be a most cumbersome weapon with equally cumbersome ammunition, it will probably disappear " unwept and unkissed " by the infantry. Light infantry defending a position will then require only rifles, light machine guns, anti-tank rifles, grenades and fireworks. Of the light machine guns, some will be required for anti-aircraft defence. Consideration of defence in depth and defence against tanks will necessitate the provision of heavy machine guns, and anti-tank guns, probably organized in " heavy " as opposed to " light " infantry units.

As light infantry will not, as a general rule, advance to assault a defended position on their own legs, it is now necessary to consider ways and means for sending them forward otherwise. In finding the solution to this particular problem, the most difficult case of all need only be considered, namely, the frontal attack against a strong enemy position. Nobody but a fool will attempt such an attack, unless he has exhausted the possibilities of manœuvre or unless imperative circumstances require it. The frontal attack, however, cannot always be avoided and a promising offensive movement will often fail unless there is some feasible method of carrying out a deliberate frontal assault.

[1] This article was written in 1937. It would perhaps be more accurate to say that present-day teaching is for infantry to attack on foot, supported by (I) tanks.—EDITOR.

Armoured Carriers

Now an assault is an assault—not a " sapping " operation. It must, therefore, penetrate quickly, widely and deeply to distant and decisive objectives, if the enemy is to be chased from the field. As the depth of modern defences is apt to be so great that they are hardly to be traversed in the day's march of a foot soldier, all the various units of assaulting troops must clearly be moved forward by various kinds of mechanism if decisive results are required. Any attempt to do the job at the pace of the infantry soldier under fire can only achieve partial results—indeed, a commander of any acumen will only try to obtain limited objectives if he has to rely on foot men for the weight of his attack. To try for limited objectives in the attack of strong defences is merely to " sap " forward—it cannot be reckoned as a proper assault.

For the true assault of a modern defensive position, echelons of fast-moving tanks, backed up by light infantry men in armoured carriers, alone seem to possess the power of seizing ground and holding it until more tanks with more infantry in tractors or lorries arrive to consolidate the " bound " and carry forward another. Tanks, alone, can achieve nothing, for the hostile infantry will lie low and the tanks will have no targets. But if the fast-moving tanks are backed up by special armoured carriers of foot men, the foot men can be rapidly spilt out on the ground to secure it whilst the tanks either destroy the defending infantry, or keep down their heads. The composition of the succeeding waves will depend on circumstances. More tanks might be necessary with more infantry in armoured carriers, or the infantry might be carried in unarmoured tractors or in lorries or they might finally move on their feet.

As any kind of movement on a modern battlefield, however well planned, is bound to be a hazardous operation, it seems essential for an assault to be carried out with the greatest possible speed. Therefore, a slow-moving infantry tank for shepherding forward foot men seems certain only to be useful when the defensive positions to be overcome consist of continuous trenches, which cannot be crossed by faster-moving vehicles. As a continuous line of trenches may well prove to be as common a feature in the next war as it did in the last, large obstacle-crossing tanks may occasionally be useful. It will, however, tend to be a purely siege weapon with limited scope of action. Where it is necessary to assault a line of continuous trenches, it will probably be better to rely on the overwhelming fire of artillery and aircraft to cover the arrangements for the passage of general purpose fast-moving tanks and their attendant infantry carriers, rather than to rely on an infantry tank, which is easier to hit, may fail to cross the obstacle and has to be accompanied by foot men.

Transportation

Having now acquired a rough notion of the basic requirements for the most difficult operation in war—namely, the frontal assault of a strong defensive position—some clear general ideas are essential about the movement of the formations and units of a modern army. In order to regain the mobility which great military leaders have always been at pains to obtain, the utmost use must be made of the mechanism which the invention of the internal combustion engine has made available.

In considering how to use the various forms of mechanical transport which are nowadays immediately available for military use, a moment can usefully be spared to investigate how Napoleon quickened up the tempo of military movement in his day. He did it in two main ways. In the first place he gave up the system of moving armies along fixed military roads provided along their length with fixed and guarded depots of stores. His troops had to live on the country, and what they could not obtain by foraging and requisition was carried with his armies. In the second place, he made his fighting troops march along tracks and across country so as to clear the main roads of every possible encumbrance. He also made roads by the score. In these two main ways, his armies became so mobile as to be able constantly to surprise the enemy with greatly superior force at a vital point. As Napoleon had nothing but horse transport for the carriage of his essential stores, it is pretty obvious that his roads were filled to capacity before any great battle, as they were bad roads and the horse transport consisted mostly of country carts. A modern army requires such a weight and variety of stores that it will be usually quite impracticable to think of obtaining even the more common means of subsistence by foraging or requisition; but it is possible to explore the potentialities of moving the fighting troops across country, to make sure that all roads are used to the utmost of their capacity and to study the rapid construction of dry weather tracks.

The enclosed fields of England no doubt suggested to our ancestors the fun and the grief which might result from hunting the fox with hounds and horsemen across them, but they are unfortunately a great hindrance to the study of war. No army in the world is at such a disadvantage in this respect as the British Army, for it can rarely move to any great extent off tarmac highways. It develops in consequence a habit of moving every part of the army on roads, and often narrow roads at that. The roads, moreover, are so good that they tempt the designer of mechanical transport vehicles to the use of engines of low horse-power which fail on rough tracks and lead to pessimistic conclusions on the possibilities of moving across country.

Now on the Continent and in many other parts of the world, it will constantly be possible to move a large part of the fighting troops off the roads, if the Army that wishes to do it is supplied with good maps, good Intelligence and pioneers. About maps it can be said straightaway that nothing is more important in modern war. Accurate $\frac{1}{25{,}000}$ maps are to-day part and parcel of artillery work and will be essential in any attempt to shorten the length of divisional columns on the march. An intelligence system which cannot, by one means or another, produce these paramount maps quickly will have signally failed to keep abreast of the times.

Pioneer battalions, like many other units to which the War gave birth, disappeared with peace, but something of the kind will undoubtedly be required on active service for the rapid construction of tracks and roads. Perhaps the light infantry battalions will be able to deal with the tracks, but road-making will require special provision. As railways will be specially vulnerable to air bombing, roads will be more important than ever, and road construction will be important from the first moment of the war. The organization of army road construction companies in time of peace would be easy, for they already exist in embryo on our great highways and are daily at work—a little organization here will well repay the labour entailed.

Road Capacity

Apart from the possibilities of marching across country, for testing which England does not offer much scope, the science of using roads to full capacity has not yet received the attention which it deserves. If a road is to be used to full capacity there is no place on it nowadays for foot soldiers, horsemen or pedal cyclists. These must either proceed across country or be carried in mechanical transport. The carriage of a large proportion of the field troops by mechanical transport is not by any means a phantasy if two conditions are fulfilled. The first condition is that units must give up expecting to possess any mechanical transport permanently, except the transport which carries their weapons and a portion of their ammunition. Everything else will have to be lifted to time table with mechanical transport from a pool so devised that any single vehicle does a reasonable full day's run every day. There is no room for idle vehicles in modern war. A lorry must do its sixty miles a day every day, just as a horsed vehicle had to do its fifteen or twenty miles a day when Napoleon's corps were on the move. We cannot afford to have mechanized transport and handle it as though it was still horsed transport, as we seem to be trying to do now. The

adoption of the principle that when a formation is on the move every mechanical vehicle on the formation will be required to do a full day's run by making several journeys to and from the front instead of loafing along for fifteen miles somewhere behind a column of marching infantry, will be far-reaching. In the first place, formations will easily cover twenty to thirty miles a day, and in the second place the number of prime movers to be maintained will be less and their capital and recurring costs will be less. In furtherance of the principle, it also follows that prime movers should be as far as possible of the same pattern and that variety in the type of lift should be obtained by the use of different kinds of trailers. The gun and limber type of traction is a proved success in war; a prime mover towing a trailer will be equally convenient. Special purpose M.T. vehicles are allowable for assaulting vehicles like tanks and armoured carriers, but for load carrying, apart from two or three standard lorries and cars, the prime movers should be separate from the load, which should be trailed. There is no loss of power in trailing a load and the convenience of it in deciding the transport of an army is of supreme value. At present we tend to have far too many special purpose M.T. vehicles. They must be cut down relentlessly, otherwise the problem of maintenance becomes overwhelming.

The second condition to be fulfilled if roads are to be used to capacity is to run traffic on roads as though it were running on railways. If horse-men, foot-men and pedal cyclists are cleared off the roads, there is nothing to prevent traffic moving by daylight at fifteen m.p.h. for hours together. On a Bank Holiday, the Dover road takes motor cars at the rate of 3,000 an hour; this gives a rough idea of what road capacity can be. We must handle road traffic in future more like a civilian bus company, and cease trying to make everything on the road bow down to the pace of the foot soldiers. From the way in which the Germans are improving their frontier roads, it is clear that they have tumbled to the enhanced importance of roads in future warfare, and realize what a huge capacity they may possess if properly used as *routes gardées*. By using roads in this manner the possibilities of surprise are obvious. It is only necessary to imagine what the Germans' sweep through Belgium in 1914 might have been if their troops had been in bus columns instead of in columns of fours.

If the above two conditions are fulfilled there will be no need to moan about the length of the Divisional columns, for it is not the length of the column that matters so much, as the pace at which the whole thing moves. Reckoned as moving at fifteen miles a day a Divisional column twenty miles long fills a commander with gloom, but if it can move at fifteen m.p.h., he can smile once more. But he must at once

give up any mediæval ideas of moving foot soldiers, bicyclists or horsemen mixed up with mechanical transport on the same road. Incidentally it is noteworthy that four times as many pedestrians and cyclists get killed on the road as motorists, so they obviously clog the transport problem even in civilian life.

Conclusions

As a military paper of any value must end with conclusions from which a staff officer can proceed to action, it is now necessary to sum up these somewhat random thoughts and put them into more constructive form.

(*a*) War will be " all-in " war and everything will be fair. As chemical warfare will be probably most useful in the attack, it should be fully explored as an attacking weapon. It is not sufficient merely to study defence alone in chemical warefare.

(*b*) *Cæterus paribus*, air power by itself will not win a war, but a great deal of administrative work is required to prevent this being possible. A general outline of what is necessary is given above.

(*c*) Frontal attack on a modern defensive position is not possible without overwhelming surprise supporting fire. As artillery has been much reduced in quantity and as bombing aircraft of greatly increased power and accuracy will be available, the surprise use of bombing aircraft for supplementary artillery fire in the support of ground formation is certain, and should be fully studied. Bombing aircraft were largely wasted in the late war; their use on the front of armies requires most careful thought and organization.

(*d*) Foot soldiers on their feet will rarely be able to advance to the assault of a modern defensive position. This conclusion should be accepted as a fact. Types of warfare where assaulting troops must obviously advance on foot can be specially treated, just as special types of warfare are so treated at present.

(*e*) Assaults on a modern defensive position may be required to be pushed home for ten miles or more and can only be attempted with tanks supported by infantry in carriers. These carriers may be armoured or unarmoured carriers, or lorries according to the conditions of the assault. As infantry tanks connote their accompaniment by infantry on

foot, they are not likely to be so useful as general purpose fast-moving tanks.

(*f*) The movement of a modern army will not be practicable unless it is quick to make use of cross-country tracks and unless it uses all tracks and roads to capacity. Cross-country tracks will be easier to select in advance if accurate $\frac{1}{25{,}000}$ maps are available in advance. These maps are also part and parcel of modern artillery technique and must quickly be made available. A modern army cannot function with nothing but inaccurate small scale maps.

Roads will not be used to capacity unless everything is cleared off them except mechanical vehicles. They should then be used as *routes gardées* at a constant speed of ten to fifteen m.p.h. in daylight. Units will only have a minimum of M.T. vehicles in their permanent possession. These will lift their weapons and ammunition. The remainder of their M.T. requirements will be supplied from M.T. pools. When a formation makes a full day's march, every M.T. vehicle, except a spare one, must run its full day's mileage, otherwise the M.T. layout is not running to capacity and road space and carrying power is being wasted.

The greatest possible use should be made of trailers so as to reduce the number of prime movers of different design to as small a number as possible.

The conclusions summarized above seem to bear with particular relevance on some of the problems which face the British Army at the present day. They have the advantage that, unlike most conclusions, they do not require the whole Army to be shattered to bits and re-moulded. Excellent mechanism, capable of regimentation much on the lines suggested, is already coming into supply, and will presently help to lift the Army out of the depression in which, for a variety of reasons, it has rested too long.

MECHANIZATION IN NEW ZEALAND

By Major G. H. Clifton, M.C., New Zealand Staff Corps.

CONSIDERATION of military mechanization has changed from questioning the desirability to searching for the means. Finance becomes the limiting factor and, paradoxical though it may sound, progress itself provides one of the greatest difficulties. Changes in design are so rapid, forced by intense competition, that only the more modern commercial vehicles can be readily maintained with spares and replacements. This has an important bearing on Service policy, for military mobility depends on commercial production. Moreover, the same principle applies to the provision of technical personnel; on mobilization we will look to existing civil sources for mechanics and drivers. With voluntary recruiting, Regular forces find difficulty in obtaining suitable technical personnel; Territorial units draw on the army of trained civilians—when the latter can be induced to join up. In addition, there is every reason to believe that the vast reservoir of commercial vehicles can be tapped for mechanizing or, more correctly, motorizing Territorial forces.

New Zealand has been endeavouring to find local solutions to both these problems of mechanization without money and extra recruits. The ideas may be of interest and possibly adaptable to a wider field. We say advisedly "local solutions" because the question of home defence has some significance in this Dominion to-day for the first time in its brief European history. Giving thanks for the British Navy and for Singapore may bring comfort but does not necessarily ensure adequate security. Any attack on New Zealand must be seaborne. Our Territorial Force, therefore, should be sufficiently equipped and trained to restrict and stop a large scale raid, even if it cannot prevent a landing. After all, the Anzacs had bitter experience of the stopping power of determined men with very few machine guns, in country favourable to defence. Vickers and Lewis guns, in holes in the scrub aided by a few strands of wire and provided with a reasonable amount of "anti" equipment, still constitute the main defence of this Dominion both in fact and financially. Experience in Spain corroborates this statement. But the troops must be motorized and so given the maximum operational mobility to facilitate dispersion for recruiting, and training, and rapid concentration to meet landings which may occur on any of our many beaches. Three schemes, all directly concerned with home

defence, are under trial in New Zealand; motor cyclists armed with light machine guns, lorry-borne field artillery, and the provision of M.T. for all units on mobilization. Let us discuss these ideas in more detail before considering whether they have a wider application.

Motor Cycle Light Machine Gunners

A suggestion for the enrolment of motor-cycle light machine gunners was put forward rather nebulously by the present author in the *Army Quarterly*, January, 1936. Briefly, the men enlist as Territorials and provide their own motor cycles; they are armed and trained as light machine gunners.

In practice, several modifications have been made to the original scheme and are worth explaining at some length because they affect both recruiting and the provision of material.

The equipment was based on the Bren gun which is not yet available for general issue to our, and probably other, Territorials. Faced with the problem of carrying the Lewis gun, an excellent harness has been evolved by the New Zealand Army Ordnance Corps. The gun itself is stripped and carried in three containers, which are supported by normal infantry web braces and belt. Slung across the back and pointing over the right shoulder is the valise, holding the barrel group with field mount attached, and also the piston rod; it opens lengthwise by means of a quick release, and has two steadying straps, one fastening on to the left brace behind the shoulder, the other on to the waist-belt. In front, the right carrier holds the gun body; while the left carrier is divided into three pockets, one each for the butt and the pinion casing the third for the pistol grip and a small tin containing the cocking handle and body locking pin. Shoulder pads of mumnah felt are fitted and the valise is lined with the same material as protection for the back. No. 2 carries the Lewis gun holdall, slung on his back. Two ordinary magazine pouches in front are balanced by a haversack, worn in the "fighting order" position, which contains three extra magazines. Both gun numbers have two haversacks, complete with braces, each holding three filled magazines, slung across the rear wheel; this arrangement is most satisfactory as it can be adjusted to any motor cycle whether fitted with a carrier pillion seat or merely a mudguard. Personal accoutrements consist of the haversack on the left side; a mounted-pattern water bottle slung under the left armpit; the respirator carried in the "Alert" position where it sits very snugly between the front carriers; and the pack topping the rear load. Alternatively all this personal gear travels in the platoon lorry, with blankets and other baggage. A somewhat "Western" touch has been added in the shape of a "tied-

down" holster for the revolver. Apart from the undoubted psychological value as a recruiting feature, this arrangement ensures that the soldier retains the weapon which is issued for his personal protection, even when the complete gun-carrying harness is discarded; as it may well be in an emergency where speed into action is vital.

Although it is possible to put a gun detachment of two men on one machine, No. 1, who carries the gun, being mounted on the pillion, the principle of one man one motor cycle has been followed. This increases the number of recruits and vehicles enlisted per light machine gun in peace; moreover, in an emergency the platoon doubles its strength by carrying extra men on the empty pillions—although this is possible only for a short run of, say, one hour. Summarising the actual gun detachment, we have two men on two motor cycles carrying one gun with spares, nineteen filled magazines and, if necessary, all personal equipment. The unit looks and is, highly mobile, having a good cross-country performance and strong defensive power. The remainder of the section are armed with the rifle and carry normal infantry equipment, except for the additional ammunition haversacks across the rear carrier. Cross-country movement with the rifle slung is somewhat dangerous and clips are being placed on the machine as an alternative.

Tests have demonstrated that the two numbers can dismount and get into action in ninety seconds, including assembling the light automatic. This is quite fast enough for all practical purposes.

Personal clothing is rather a problem. The wide-brimmed felt hat worn by New Zealand troops is worse than useless—a menace really—on a motor cycle; some form of beret or waterproof, peaked cap would appear preferable. Also puttees are unsatisfactory and will probably be replaced by knee-boots or gaiters; alternatively, the ordinary civilian thigh overall may be issued, and worn over breeches and puttees when riding.

Organization and Terms of Service

In the original scheme it was suggested that motor cyclist sub-units fitted most naturally into armoured-car or motor-cavalry regiments. Despite this affinity, in New Zealand we have added one platoon to each infantry battalion—for three reasons. Firstly, the most difficult recruiting area for non-technical units is the city, and this new scheme appeals to men who otherwise seldom become Territorials; at the moment, we have one platoon of four Light Automatic Sections in each of our twelve battalions; the response has been so good that a second platoon will probably be formed at an early date. Secondly, almost every large town has a motor cycle club which, with one exception, has

co-operated whole-heartedly not only by carrying out the actual recruiting from members, but also by " vetting " the machines which were forthcoming. Thirdly, we anticipate and teach that the primary tasks of motor cycle units are " seizing and holding " and " distant protection " ; in both roles they are complementary to motorized infantry ; therefore, make them infantry. If each battalion is provided in the emergency with mechanized first-line transport and sufficient vehicles to carry the complete unit, then the motor cyclists fit into the organization perfectly.

For all running done during training, whether in or out of camp, the military authorities issue petrol at the rate of 40 miles per gallon, and lubricating oil on a pro rata basis ; this is equivalent under local conditions to mileage at one halfpenny per mile. In addition, responsibility is accepted for all damage to rider and/or machine which occurs while on duty, including going to or returning from parade. Full compensation is paid. Otherwise the terms of service are those applicable to all Territorials—free uniform, pay of rank, etc. On these modest conditions men enlist and use their own motor cycles during peace training. It speaks volumes for their enthusiasm and for the readiness with which the scheme has been accepted by all concerned, when we add that platoons have been recruited up to full strength within one month of formation, and that several have waiting lists.

Training

Every man in the platoon is a trained gunner ; the primary task of the section is to get their gun into action at the best place in the shortest time—and keep it firing. Each man must be able to use a rifle and, in addition, should handle the revolver with reasonable efficiency. Map-reading and training in the use of ground are essential ; many situations will arise where sections, or even individuals are given orders off the map and, having speedily reached the correct place, will choose their own ground to fight on. Message and report writing, patrolling and reconnaissance generally, in fact all the interesting work of an intelligence section, can be superimposed on weapon training and mechanical instruction. In addition, mounted work can be carried out during week-ends, possibly in conjunction with club field trials. With such a varied programme the motor cycle platoon should never suffer from idleness or boredom—the twin causes of dry-rot which are so difficult to eradicate with limited training equipment or facilities. Owing to the scheme being launched in New Zealand immediately before the collective training period, there has been little opportunity to practise tactical handling. Yet sufficient experience is available to corroborate the

original suggestions; motor cyclists increase training areas by making any suitable ground accessible within a radius of 100 miles; and keen rivalry can be stimulated, and realistic exercises fought, between widely separated urban units. Moreover, their tactical handling, in fact, and in tactical exercises without troops has speeded up mental reactions to terms of 30 m.p.h.; commanders must go wide and think quickly to obtain full value from these highly mobile gunners. In New Zealand, the majority of the Regular and Territorial Officers have never seen modern tanks or armoured cars and get few opportunities to move troops by M.T. Employing motor cyclists, with the necessary backing, is undoubtedly developing a mechanized complex and having a most invigorating effect on the military forces generally.

Motor Cyclists with Mounted-Rifle Regiments

Whatever the proportion allotted to infantry battalions, there is much to be said for adding similar sub-units to our mounted rifles. When we think of cavalry we still include the horse, although it was eliminated as an effective weapon seventy years ago, and, next to the man on his feet, is the slowest means of modern transportation. Yet in difficult terrain the horse still furnishes the best mobility, especially if properly supplemented by motor transport. New Zealand is a case in point. Large areas between main roads are impassable on wheels; pack transport is the natural complement to mechanization. Despite all predictions to the contrary, horses were used extensively in Abyssinia, although the devastating effect of blister gas on animals was amply demonstrated. But mounted riflemen have a definite and necessary role in defending New Zealand; they can, however, be mounted equally well on motor transport. It may be vital in an emergency rapidly to concentrate every available machine gunner and rifleman in a threatened area over 100 miles distant. With properly organized local transport, mounted units in light trucks can move at the requisite speed and act as "motor cavalry" on arrival. This role is easily practised during peace training.

Moreover, their mobility and fire power may be invaluable, when the regiment is horsed, to seize and hold ground, for really wide flanking movement or as a reserve for innumerable tasks. Under such circumstances, a motor cycle troop, as with infantry, fits naturally into the organization.

Anti-Tank Action

If a serious attack is made on New Zealand, we must expect that the enemy will have overwhelming air superiority. On the move, widely-

spaced motor cyclists are fairly inconspicuous and not easily attacked by aircraft; once in position these advantages grow. It is also reasonable to anticipate that any landing force will include light tanks, not only to clear the beaches but also to penetrate inland and break up movement towards the occupied area; our terrain, however, is definitely poor tank going, being too much on end and too broken. If the beach defence is not already in position, the initial ground opposition will be provided by motor cyclists who, in addition to normal action, should be equipped and trained to close the ring against tanks by blocking all defiles and covering these blocks with fire.

The platoon commander requires either a light car or truck, fitted with wireless; this will economize despatch riders for keeping touch. Preferably, the vehicle should have armoured protection for the driver and a light machine gun mounted for air or ground action. Again, the sub-unit requires at least one light truck for petrol and ammunition, and a second for cooking gear, supplies and baggage. There is no practical reason why the platoon (or troop) should not carry A.V.[1] contact mines, either in the pack on the rear carrier or in a lorry, or both. One section, so equipped, could deal effectively with the average New Zealand road. After all, this mine is a simple, portable obstacle which any intelligent soldier can handle.

Artillery Mechanization

Replacing gun-horses by some power-driven prime mover is nothing new; the difficulty has been to combine adequate cross-country performance with modern road speeds. Normal artillery wheels will not stand up to hammering along behind a lorry at 30 m.p.h. After trying rubber pads and other expedients, most modern armies have experimented with and are finally adopting some form of pneumatic-tyred wheel for all artillery up to and including medium. The initial cost is fairly high, mainly because a new axle is usually necessary. Alternatively, the gun, with its present wheels, can be carried either on a lorry or on a transporter; both systems have definite disadvantages, although both are practicable. Placing the gun on the lorry is, however, cheapest, requiring only slight modifications to the lorry body and additional fittings. The problem in New Zealand is complicated by two factors. Firstly, special vehicles cannot be purchased in peace-time and are unlikely to be available in war, therefore any equipment must be based entirely on commercial resources. Secondly, many areas in this Dominion are difficult to traverse even under good conditions, owing to the abrupt gullies, often choked with dense scrub or bush, which intersect

[1] Armoured Vehicle.

the country. Under such conditions, particularly in wet weather, six-wheeled lorries would probably fail; horsed teams and agricultural tractors might get through.

Considering field artillery only, the logical prime mover for cross-country movement is therefore the tractor; it can be carried, with the gun or howitzer, on a standard commercial lorry for road travel at 30 m.p.h. Incidentally, the wooden loading ramps (18 inches by 4 inches by 12 feet Oregon) can be put down as an improvized bridge for the carrier lorry over gaps up to 10 feet wide—a great asset under New Zealand conditions where swift-flowing creeks with deep narrow channels are so often encountered. A photograph (see frontispiece) shows this ramp bridge in use. The loading on the lorry is interesting. Note how the rear wheels of the tractor are raised, allowing the 18-pdr. trail to slide underneath, thereby bringing the main load nearer the back axle. Cross-country movement with the lorry is restricted by the high centre of gravity, mainly due to the piece itself; it is hoped to improve this by slotting the lorry floor and sinking the gun wheels 12 to 15 inches until they rest on the chassis members. Ammunition for battery supply is carried in 18-pdr. waggon limbers or 4.5-in. waggons (both having a limber hook) fitted with commercial lorry wheels and drawn behind the carrier lorry; for cross-country work the waggon connects tractor and gun, the latter having a "claw" attachment which lifts the spade. The lorry wheels are placed on service pipe boxes because, if roller-bearing hubs are used, the existing axle must be drastically cut down, probably beyond the safety limit; whereas the present scheme leaves the vehicle intact and the original artillery wheels can always be replaced. It has the disadvantage, however, of depending on direct bearings which are grease-lubricated; tests have shown that the vehicles will travel at 30 m.p.h. for four hours without developing a "hot box." Careful maintenance is the answer. Any agricultural tractor, whether tracked or fitted with pneumatic tyres, has the requisite hauling power to deal with field artillery. Limiting maxima are overall length 9 feet, and weight 2 tons—to keep within the carrying capacity of a standard 3-ton lorry; sufficient tractors are available to equip all our batteries.

The solution to our main difficulty, carrying the 18-pdr. gun on a lorry, has come from Canada in the form of the Martin-Parry adapter, which, briefly, is a simple system for attaching pneumatic-tyred wheels to the existing gun axle. Sufficient adapters were obtained to equip all batteries for peace training. They have given excellent results during recent practice camps; shooting is not affected, and road speeds of 40–50 m.p.h. can be maintained. As regards 4.5-in. howitzers, orders

are being placed for the necessary stores to convert them to pneumatic-tyred wheels. This will simplify still further our artillery transport problem.

It was considered that a limited number of War Office field artillery tractors should be obtained to test their performance under New Zealand conditions and provide a standard for commercial vehicles of similar characteristics. Six Morris six-wheeled chassis were promptly delivered from the United Kingdom, the bodies built in our Railway Workshops to War Office blue-prints, and the completed vehicles hustled into training camps. They have given good results, despite the fact that the gear-box and winch gear were making " positively their first appearance " in New Zealand. Only experience will show whether they can do everything required under local conditions and only increased sales will overcome the defect that Morris six-wheelers are few and far between in this country.

There still remains the important question of battery staff and other special vehicles. Both Canada and Australia have tested out modified commercial equipment and this experience is available. Apart from light cars, in the absence of any tracked vehicle, probably the best solution is a commercial six-wheeler with shortened chassis. Australia has standard four-wheelers adapted in this manner as prime movers for gun transporters ; but this design was evolved before lorries of the " Sussex " type were in production.

General Mechanization

If the establishments laid down for the British Army are converted into terms of local commercial vehicles, we have ample M.T. resources in New Zealand to provide all formations with first and second line transport. Actually, the annual turnover is more than enough to fill our modest requirements, even if the choice is restricted to three widely-used makes. Impressment becomes the obvious solution and is discussed in detail later ; when the emergency comes, every vehicle taken can, and should, be less than twelve months old and therefore quite modern.

Replacing 30-cwt. and 3-ton lorries is simple. As regards the 15-cwt. G.S. Truck, at least four firms import the components from which this particular vehicle is made ; if necessary, it could be produced from assembly stocks. But all these firms sell commercial lorries with similar characteristics to the G.S. Truck and a sufficiently high cross-country performance for New Zealand conditions. What is equally important, in at least two cases, similar engines are installed over a wide range from 8-cwt. vans to heavy lorries which carry 10 tons. This

power standardization has obvious advantages for maintenance in the field.

Specialist Vehicles

There are, however, numerous specialist vehicles which require detailed consideration. Of all infantry transport, machine-gun carriers are most important and most difficult to provide. The Carden-Lloyd type of vehicle is, as far as the author knows, not used commercially—certainly not in New Zealand. On the other hand, numerous tracked tractors are available and may solve the problem. The American "Caterpillar" Company advertise an armoured body for their larger vehicles, which has given fair results; it is readily removed, and is therefore economical. Presumably similar action could be taken with other tractors of the crawler type. Again, an armoured box, enclosing the driver, gunners, etc., combined with a protected fore-end, can be fitted to a suitable flat top lorry. As with the normal M.G. carrier, the unarmoured rear space has lockers for stores, ammunition, etc., on which the spare numbers travel when not in action. This improvisation lacks the cross-country performance and the low height of the Carden-Lloyd carrier—but it would be better than an unarmoured vehicle. Whether a tractor or a truck is used, the necessary plating should be provided and stored in peace and all the details of fitting rehearsed.

As part of our mechanization programme, a limited number of armoured machine-gun carriers have been ordered. They will be fully employed, not only in their normal role, but also for training purposes to demonstrate the cross-country capabilities of the fully-tracked vehicle and even to represent light tanks. If fitted with towing equipment they can also assist our field artillery as "light dragons."

Here again, New Zealand must balance cost against risk; it is doubtful whether the provision of armoured vehicles, even tractor type, can be justified when we remember the purely defensive war for which our Territorial Force is preparing. True, there will always be the problem of counter-attack, where any protection is valuable for supporting machine guns, which may require to change position quickly over a bullet-swept area. The armoured box-lorry carries either the Vickers gun or the mortar. This is a definite advantage under local conditions, where mortars become most important supporting weapons, firstly because of the mountainous country, secondly because bombs are cheaper than shells, and can, if the necessity arises, be improvised locally.

To meet a landing, or, more correctly, to reinforce the local troops who are opposing a landing, machine guns and mortars may be rushed at least 100 miles by road. During this move the transport will probably

be subject to attack by aircraft and possibly by light A.F.V's which have broken through the cordon ; under these circumstances, the armoured box has definite advantages. Moreover, every vehicle can carry an extra Lewis gun, on a telescopic mounting, for air or ground action.

Signal requirements, including wireless, can be met from commercial sources ; Canada has recently completed useful tests in this direction. Cable-laying still presents difficulties not so much due to paying out off a lorry as to tucking the line away properly at speed. Engineer equipment calls for a standard lorry fitted with the latest power take-off and possibly winding gear ; ample power-driven tools are available. What limited bridging equipment is held in New Zealand can easily be carried on commercial vehicles, including trailers.

Impressment of M.T.

As we have already indicated, a substitution table indicates requirements and is arranged by localities according to mobilization centres. The principal motor firms submit an annual return of detailed district sales, showing what lorries are available and where they are situated. For at least the first year, distributors receive a monthly " service " report on every vehicle they have sold. It follows that, when the emergency arises, the firms concerned can submit a list by districts of the most efficient lorries, together with reports on their mechanical condition and, if desired, valuations. Given the necessary authority, on this information impressment can be applied without making any preliminary contact with owners. Vehicles are taken over on a basis of either outright purchase or replacement, plus compensation. This scheme leaves a great deal to be done after the onset of war ; yet provision of M.T. will keep pace with other vital preparations which, owing to financial and political considerations, will be postponed until the necessity is obvious. Plans for taking up lorries must be supplemented by arranging for many details : vehicular fittings, such as canvas covers, racks, lockers, etc., spares, fuel ; all the multitudinous requirements without which motor transportation is almost useless. Action in this direction has already been started, but much remains to be done.

Apart from actual unit transport, lorries and buses are needed for the movement of the troops themselves. It would appear to be uneconomic and unnecessary to impress these vehicles, of which there are ample available partly from commercial sources, mainly from three Government Departments—Railways, Public Works and Post and Telegraph. If plans are worked out for each locality, practised wherever possible during peace training and thoroughly rehearsed during the

precautionary period, then the majority of these vehicles can be collected in a matter of hours.

Motor Transport Personnel

If the provision of material becomes largely a matter of planning and intelligent anticipation, to obtain the necessary technical staff is equally important and even more difficult. As with vehicles, the motor industry in New Zealand has an abundant supply of efficient drivers and mechanics. But few of them are Territorials and those who are serving, with their military knowledge—scanty though it may be—are so valuable that, when war comes, they should not revert to their civil occupation. Trained soldiers will be at a premium ; not mechanics. How can this pool of civilians be drawn voluntarily into our mechanization scheme ? One suggestion is that units should have an M.T. group, or section, recruited on special terms under which they attend in peace only when mechanized training is being actually carried out—that is, for annual camp. Again, an organization might be adopted similar to that recently laid down for the Royal Defence Corps in the United Kingdom, whereby the members have been enlisted as Special Companies of Territorial Regiments, with the obligations of reporting regularly to their unit and coming up for service when the emergency arises. Still a third suggestion is to utilize volunteers with the necessary qualification from semi-military organizations such as the Returned Soldiers' Association or the Legion of Frontiersmen. Whether this is feasible depends on local conditions and personalities ; in one instance this year, a Squadron of the Legion co-operated most effectively with the Taranaki Regiment, by forming the lorry column for a series of exercises in which the battalion was fully motorized. Any of these suggestions will have the desired effect of attaching to each Territorial unit, local mechanics and drivers who are known and who will be available in an emergency.

Motorization of Territorial Force

Mechanization or, more correctly, motorization has featured prominently in the vigorous steps which are being taken to modernize the land forces in New Zealand. For training in peace and on mobilization first, as well as second-line transport will be motorized. Moreover, for outdoor training in peace sufficient M.T. is being provided to lift all personnel, as well as weapons and stores. The necessary transport comes from two sources ; firstly, a pool of Army vehicles in each Military District ; secondly, by hiring suitable commercial vehicles. At the moment each District pool consists of : two G.S. 6-wheeled lorries (field artillery tractors), four G.S. vans, four G.S. trucks and two motor cycles.

This is considered the minimum number which can be given full-time employment if used by all units for training. Pool transport is controlled and maintained by Regular A.S.C. personnel, but when allotted to any Territorial unit is handed over to and becomes the responsibility of that unit for the time being. This means that vehicles are 100 per cent. " General Service," changing their role and identity with each re-allotment. They are designed accordingly. For instance, the G.S. van is fitted as a wireless carrier, or for reconnaissance, or an emergency ambulance or, when stripped of all fittings, as a general utility 15-cwt. vehicle. For the trucks and vans, Standard Commercial Ford V8 and Bedford 26-h.p. chassis are used with special bodies built generally to War Office plans, but modified to meet our local training and mobilization requirements.

Following the general principles set out in the preceding paragraphs, hired vehicles constitute the bulk of our peace-time transport. The Australian system of paying daily hire, plus mileage, has been adopted. Where departmental stocks of fuel and lubricants are available, issues may be made and charged against the hire costs at Government contract rates; the consequent saving of 4d. per gallon makes the mileage rate infinitely more attractive.

Sufficient experience with this motorized organization has already been gained to prove its advantages. Training is more attractive and more flexible; the best area within fifty miles can be reached quickly and in reasonable comfort. Beaches for inland units, field firing area for city troops, inter-urban " battles "—all become more feasible. Better recruiting and higher efficiency must follow.

Conclusion

To defend the shores of New Zealand against seaborne attack, the co-operation of all three Fighting Services is essential. For the Army, mobility becomes a vital factor, and the steps which are being taken to motorize the Territorial Force have this end in view. Motor cyclists armed with light automatics have already proved their value. They must be backed up, at speed, by infantry, and even mounted riflemen, in M.T.; all supporting weapons, Vickers guns, mortars and artillery require equally rapid transportation. The system we have outlined appears to be practicable while necessitating the minimum peace-time expenditure. The new Field Service Regulations lay down—" In the end, the strength of the defence lies, as in all form of fighting, in the spirit, skill and endurance of the troops." That strength may be vitiated by lack of weapons, of ammunition, of national support, in fact, by lack of adequate preparation. Mechanization is one factor only.

RECRUITING

A VISIT TO BLACKPOOL

By Captain W. P. Nicol, R.A.

ONE of the reasons why the Army fails to attract recruits is that it is not seen about enough. Except in garrison towns very few people at home have an opportunity of seeing how the Army lives, shall we say, in its natural state, or of acquiring any knowledge of the trend of modern developments; and I doubt whether it is an exaggeration to say that the majority of civilians who live only a very few miles outside a military station are utterly ignorant of what units are in the station, let alone how or where they may live. This is an unsatisfactory state of affairs because, if the Army is to attract recruits, it must keep itself permanently in the public eye; whereas, under present conditions, it seems content to emerge from its well-worn earth on a few specific occasions, such as tattoos, ceremonial parades, recruiting marches, and the like, thereafter going to ground until it is dug out again the following year. Now, such spasmodic efforts undoubtedly produce spasmodic results; holding the attention of the public in these days, on the other hand, demands continuous effort, and it is in maintaining continuity of interest that we fail.

The Army can be said to resemble a firm that is trying to sell its product to a somewhat unenthusiastic section of the public, while on the market are offered plenty of alternatives, some of which seem to promise far better value for the same money. Faced with such a situation, the firm must either improve the article until it is beyond question superior to its rivals, or it must suggest this fact so skilfully, by advertisement and salesmanship, as to convince all possible consumers. Either course will cost money, but if the firm wishes to remain in the market the conditions must be accepted. The Army is in exactly the same position: it has something to offer to a limited section of the public—employment to young men. But owing to the fact that these young men are equally offered what seem to them more tempting alternatives in the labour market (including, unfortunately, employment with the other two Services), so the Army, like the firm, finds itself in constant competition with its rivals. In the same way, then, it must either improve the article, which will entail improving conditions of service until a career

in the Army is at least the equal of any other, or it must keep to the original quality of article and improve its method of advertisement and salesmanship.

There is no space here for discussion of the improvement of conditions. Everybody, from the Army Council downwards, has aired his views on this subject, and we all know what actually is being done. But what I would like to suggest is how we ourselves may become more useful salesmen, and so expand our circle of customers without any great capital outlay. In every walk in life, I maintain, personal contact is of the very utmost importance—it produces results quite out of proportion to the effort involved—and it has seemed to me that in this respect we do emphatically fail. We ought to start from the bottom rather than from the top: displays, posters, recruiting marches, press propaganda, etc., undoubtedly play their part, but they are purely impersonal forms of advertisement appealing to the masses rather than to the individual, and often to the man who is not needed rather than to the man who is. No matter how carefully planned, there must always be an enormous amount of wasted effort in the large-scale advertisement. Now, it is an axiom that the contented soldier is the best recruiter that exists; but this only applies in a limited degree. The soldier on leave does not travel, largely because he cannot afford to do so, and his circle of acquaintances is usually small; at the same time, he has to contend with many obstacles including, not only contented men from the other two Services, but also discontented men from his own, and though the latter are few in number, they do infinite harm. The Englishman is a born "grouser," and though most grouses are forgotten next morning, or drowned in the local pub. that night, once in a while they remain; it is, unfortunately, the fly rather than the ointment that gets remembered. So that, while by no means disputing the truth of our axiom, I am convinced that the contented *unit* is quite as effective a recruiter as the *individual*—provided it has an opportunity of being seen.

I do not for one moment suggest that we should revert to the days when each unit raised its own recruits in hot competition, not only with other branches of the Service, but also with other units of its own arm. But what I do maintain is that if we are to achieve the personal element and hold the public interest, then units of all arms must be seen. They must move about the country—not just from one station to another, but to districts where the Army, in the ordinary course of events, never penetrates; not merely at specified times of the year, but at any time that their presence in a particular locality may be welcomed. And it is seldom that, preliminary arrangements having been carefully made, the ordinary well-run unit will not be welcomed, always provided (and this

appears to me of vital importance) that such visits are of a purely private nature and are not heralded as recruiting marches. A recruiting march is a particularly crude form of advertisement ; once it is announced as such, each member of the public instinctively forms a protective armour, determined under no circumstances to be lured into taking steps that may be regretted later. Though a well-organized march may possibly attract a few recruits, it is debatable whether these would not have joined the Army in any case and whether they are not considerably outnumbered by those in whose minds the seed of suspicion has been sown by the mere use of the word " recruiting."

As I have said above, the unit can do a great deal towards establishing personal contact and building up public interest by moving about the country. Several times a year each unit should set out for the week-end, visiting both towns and villages, mixing with the inhabitants at one place before quietly moving on to the next, possibly completing a round trip of two to three hundred miles during a long week-end—a simple business in these days of mechanization. Units must move with at least a proportion of their equipment in order to arouse interest, but never for a moment should they suggest that their purpose is recruiting ; rather should they adopt the attitude : " We have a jolly good life, as you see. You can join up, or not, just as you like and, of course, we will help if you want to. But we are quite happy without you ; and now we are moving on somewhere else." Is not that frame of mind far more likely to induce the young man to believe that it is a fine thing to be in the Army than the somewhat vacuous face he constantly sees grinning at him from a poster ? Two arguments, at least, will be put forward against this form of advertisement—first, that it will be expensive ; and secondly, that the administrative arrangements will be too difficult. But to the first I reply that it is money well spent, not merely from the recruiting point of view, but because of the training value of long route marches—an exercise we practically never practise in peace though we cheerfully accept our liability to carry it out successfully in the opening stages of the next war. And to the second I reply by asking : are they so difficult ? In every town there is a mayor, in every village a vicar, and everywhere there are the police, let alone friends of officers in the unit—it will be rare indeed that some, if not all, do not do their utmost to help.

To illustrate how simply this can be done, I give here a brief account of a week-end visit paid to Blackpool by a mechanized field battery stationed at Catterick. It began as a private arrangement between the Mayor and Corporation of Blackpool and the battery, and, although later it had more or less the official blessing of both Northern and

Western Commands, it retained to the last its private aspect, and as such may be taken as a fair example. Some time during the summer I wrote to the Mayor of Blackpool, suggesting the visit, and very quickly received the reply that Blackpool would be delighted to see us at any time. The ice was effectively broken, and all that had to be done was to fix the date. Eventually, the first week-end in October was decided upon, so a week or so before this the Battery Captain and I carried out a reconnaissance of the route and of Blackpool itself. Everything was made extremely simple for us; we were most hospitably received, and in a very short time we had decided where the battery should stay. This was in the old grandstand at Squire's Gate, which gave excellent covered accommodation for everybody, with facilities for washing, cooking, etc., and a good piece of flat ground for the gun and vehicle parks. It was arranged that the battery should arrive on Friday, carry out a few demonstrations on Saturday morning, and return to Catterick on Sunday.

The March

On Friday, 1st October, at 8 a.m., the battery moved off, preceded, five minutes previously, by an advance party consisting of:—

One 3-ton lorry Two 30-cwt. lorries Two 15-cwt. trucks One M/C despatch-rider	under the Battery Captain.

It carried the officers' and sergeants' mess, officers' kits, men's blankets, rations for two days, and sufficient personnel to carry out the necessary tasks for the feeding and accommodation of the main body on arrival. It arrived in Blackpool after an excellent march at 1.15 p.m.

The main body consisted of:—

Three Austin 10's with W/T. One Austin 7. Two M.Cs. One dragon with the A.A.L.G.	Staff.
Four 18-pdrs. with dragons. One spare dragon.	Gun group.
One breakdown lorry, R.A.O.C., with trailer.	

The total strength of the battery was 4 officers and 64 other ranks. The route followed was Catterick–Ripon–Killinghall–Skipton–Clitheroe; thence by the Preston by-pass to Blackpool, the distance being just over 100 miles. It is by no means an easy route, as there are many sharp corners, and in one place a very steep hill, to negotiate; but there were no incidents and, as the battery moved well opened out, there was no

dislocation of ordinary traffic. The police, who had previously been notified of the move, assisted everywhere with their customary efficiency, particularly at Skipton, where a long halt was made for lunch and refilling. A short delay occurred on the Preston by-pass, due to a dynamo chain of one of the dragons breaking, but the dragon was quickly picked up by the breakdown lorry, and the main body arrived at Squire's Gate at 6.45 p.m. This breakdown was the only one that occurred.

On our arrival we found that the advance party had done marvels. Hot dinners were waiting for the men, and quarters for everybody had been prepared, while the Town Clerk and one or two reporters were waiting to receive us ; the latter, after plying us with questions, bustled off to write somewhat garbled versions of our replies for the edification of the natives the following morning. It was arranged that after their dinners and having tucked the guns and vehicles up for the night the men should be free to do what they liked ; in a very short time the whole camp was deserted, except for a guard. All the men went out dressed in blues or service dress, and very smart they looked, in spite of the fact that some of the more impecunious were in borrowed plumes. Passes were issued till reveillé, but very few stayed out after midnight as they were all fairly tired after the march and had been warned that they were in for a strenuous time next day.

Early on Saturday morning we began cleaning up, and a crowd soon collected outside the railings surrounding our gun-park. After breakfast we all got into our best clothes, and when everything was ready the gates were opened and the crowd came in. We gave them a little time to look round and ask questions, after which the battery limbered up, pulled out and gave a demonstration of coming into action. This was extremely popular, but even more so was the announcement that those who wished could have a ride in the dragons. There was an ugly rush of men, women and children, but somehow we sorted them out, and in the end nearly everybody had had a trip. I had arranged for some nurses from the local hospital to come along with collection boxes, and, though I never heard what the total was, none were empty by the end of the morning ; I think most people contributed something. In addition to the guns and dragons, the wireless cars, range-finder, director and anti-aircraft Lewis gun were on view, with men to explain the working of each, and the crowd moved about from one to the other apparently very interested.

At 11.30 a.m., I ordered the battery to form up on the gun-park again and shortly after, as previously arranged, the senior alderman, as representing the Mayor, accompanied by four or five councillors, arrived

to inspect the battery. The alderman walked round the battery, watched it come into action, had a trip in a dragon and a talk with a councillor on the wireless, and the party then repaired to the officers' mess for sherry. This was one of the most popular moves of the day, and from that time on hospitality was showered on us. The battery closed down at 12.30, and after dinners everybody went out. All the men were made honorary members of the Tower Ballroom and Winter Garden; there was a league match in the afternoon; and Blackpool at that time of the year is in the throes of the illuminations, which have to be seen to be believed. I gather they all had a very good time. As far as the officers were concerned, there was no looking back. We were entertained to lunch by the Mayor; taken on to the football match; plied with drinks before, during, and after it; taken for a ride along the front in Blackpool's newest tram (which is constructed in the form of a life-boat); and finally escorted to a supper dance. And we were asked to repeat the visit next year.

The return was a sad affair—judging by the glum faces of some, it could almost have been classified as a retreat—and it required determination to turn one's back on Blackpool and face once more the bleak desolation of Catterick. But we were all quite "broke" by Sunday morning, so we could not have stayed in any case! The march was again devoid of incident. The advance party stayed behind as rear party to clean up, and the main body followed the same route back, except that at the request of the Area Recruiting Officer it went through Preston instead of by-passing it. We reached Catterick at 6.15 p.m., having left Blackpool at 8 a.m., and again we had a long halt at Skipton. It was another good march and all through the driving and march discipline were excellent. The total mileage, including joy-rides at Blackpool, was about 220 miles for the dragons, with 20 to 30 more for the Austins and motor cycles due to running up and down the column.

Conclusions

It may be asked what, apart from the publicity value, was achieved by all this. The answer is most convincing.

In the first place, the battery was put to a test quite outside the scope of ordinary training. By successfully carrying out the test we proved that, provided the artificers know their job, drivers have been carefully trained, and all ranks fully realize the importance of march discipline, a march of 100 miles is a comparatively simple feat and need cause other traffic no discomfort.

Secondly, it made everybody use their brains, and to some purpose. Transport, rations, petrol and oil had to be organized; timings needed

to be carefully worked out and communicated to the police to ensure an easy passage along the route, while every possible contingency, such as a bad smash or somebody being injured, had to be provided for. It was by no means all jam for the officers and senior N.C.O.s.

Thirdly, it gave the men a break from the deadly monotony of station life. Practice camp, inspections and manœuvres were ghosts of the past, and we were embarking on that gloomy period which we glorify by the term " individual training," and which, in effect, means that everybody tries unsuccessfully to do six other people's jobs for about as many months in the year. It gave the men something to look forward to and something to look back on : anything that keeps them happy and interested can never be classified as wasted effort.

And finally, of course, we advertised the Army—not by enormous placards or blaring loud-speakers, but as a company of ordinary happy human beings out to enjoy ourselves and at the same time ready to explain, to anyone who cared to come and see, how we lived and how we worked. Some people expressed surprise and wanted to know what we were doing in Blackpool ; we told them that we had just come for the week-end, which surprised them even more. But there is no shadow of doubt that all those who did come to see us were intensely interested : what could be better recruiting propaganda than that ? As regards the cost of the march, we consumed 355 gallons of petrol and a certain amount of oil, but the cost of this to the State was more than compensated by the value of the practical training. To these expenses must be added a certain sum for the wear and tear to vehicles and guns, but this again was negligible in the balance. In conclusion, this march was carried out by a mechanized field battery. Equivalent units of the other arms may have more or fewer difficulties to contend with on a similar expedition. But however great the difficulties, it is the principle that should not be forgotten : it is better to move ten miles out of a station than not to move at all. The personal element is that which counts the most.

AIRCRAFT AND MECHANIZED LAND WARFARE
THE BATTLE OF GUADALAJARA, 1937

By Captain Didier Poulain, French Army Aviation Reserve

MALAGA had just fallen. The Government forces, fearing to see their line of retreat to the East cut off by the troops attacking from the North towards the shore, had abandoned the city. The ease of this victory probably made the winners over-confident for future operations. There were 20,000 Nationalist troops forming two or three divisions reinforced by batteries of artillery on tractors, and a certain number of light-weight " Ansaldo " tanks. That these twenty-thousand men were transported across 800 kilometres of Spain in 2,000 lorries without the secret of their movements being revealed, was indeed an extraordinary fact. Much could be said on this occasion about the Red Army's insufficient use of reconnaissance aircraft. To tell the truth, it would seem that on both sides distant strategical reconnaissance of the enemy had been deliberately and constantly neglected.

At all events, in the beginning of March, 1937, the Nationalist divisions coming from Malaga were in position to the North-East of Madrid in front of a sector almost devoid of Reds : devoid to such an extent that although the attack began on the 8th of the month, it was nine days later before the first solidly organized brigades of Governmental troops were encountered. In the meantime, however, the battle had been won by aircraft, while on the ground several battalions of infantry and a few tanks exploited the success of the air forces.

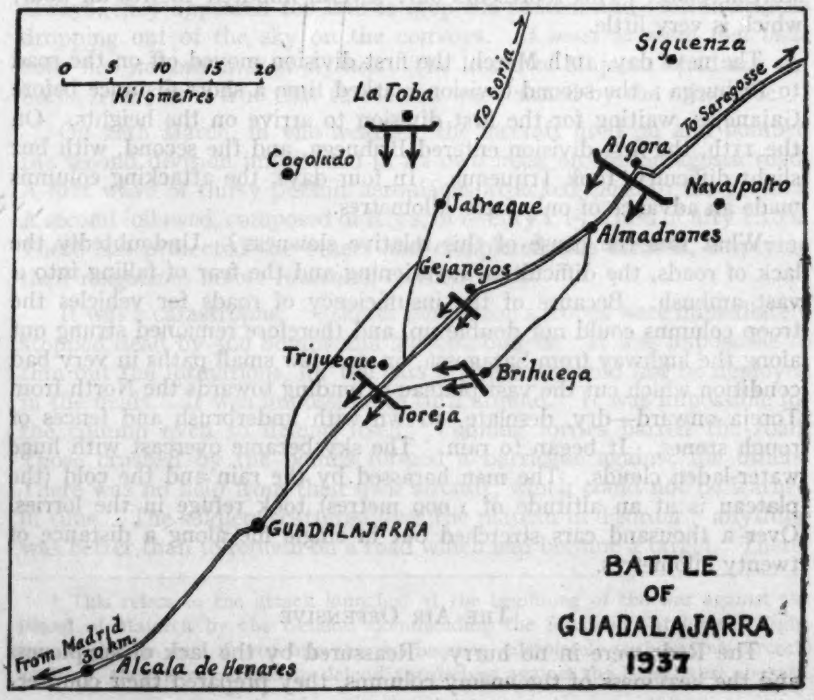
The battle of Guadalajara bears the name of a district of New Castille where it took place, on the high plateaux which slope gradually from Siguenza to Madrid along the River Henares. It was there, on the 11th and 12th March, that General Bergonzoli's motorized columns were completely defeated by a hundred and twenty odd aeroplanes and some meagre land forces of the Government. We must study and try to understand the reasons for this defeat which can, and *should*, influence the organization of modern armies.

During the course of the past years we have noticed the extraordinary infatuation for the motorization of fighting units. In Germany, as well as in France and Italy, the staffs have been swearing by motors, trucks, artillery on tractors, caterpillar-vehicles armoured or not, and tanks.

And so it stands. The famous German armoured-divisions are terrible weapons. But it is certain that there are limits to their usefulness. War is somewhat like a game of Poker where there are no guaranteed winning combinations: the Italian divisions wiped out at Trijueque and Brihuega by the Russian air-squadrons somewhat resemble a "Royal Flush" which yields to "Four Sevens." Let us be wary of cut-and-dried opinions. The defeat of Guadalajara does not mean the complete failure of motorization; but only the failure of a particular means of employing it under very special conditions. It is also a demonstration of the fact that, in spite of the very real power of mechanical units, these can present weaknesses *sui generis* that must be acknowledged in order both to avoid them in one's own ranks and exploit them in the enemy's.

The Nationalist Plan

Thus on the morning of 12th March, 1937, the Italian forces were routed after three hours of action. For the first time in military history, we witnessed an operation carried out by mechanized troops—a total



of 25,000 to 30,000 men on wheels or on caterpillar tracks. This mass prepared to hurl itself on Madrid like an avalanche of iron and fire. Machine-gun carriers, tanks, and armoured trucks were to clear the road. Five hundred metres in rear, the infantry were to follow in lorries, escorted by light artillery.

The principal axis of the attack, directed South-West, followed the main road from Saragossa to Madrid. Detachments on the flanks moved westward on Cogoludo, while on the South, a secondary column was directed on Brihuega. The main objective was the town of Guadalajara, 55 kilometres away. After that, for the second bound, all hopes were permissible—perhaps even Madrid.

The affair began magnificently. The Reds were completely surprised. Their frail outpost screen melted away without offering any resistance. After that it is difficult to understand exactly what happened. With no resistance before it, the mechanized mass should have gone through the enemy zone like a knife through butter. As a matter of fact, on the evening of the 9th, thirty-six hours after the opening of the attack, the most advanced sections were only about twenty kilometres from their starting-place. This represents only several hundred metres an hour, which is very little.

The next day, 10th March, the first division moved off on the road to Brihuega ; the second division marked time a short distance before Gajanejos, waiting for the first division to arrive on the heights. On the 11th, the first division entered Brihuega, and the second, with but slight difficulty, took Trijueque. In four days, the attacking columns made an advance of only forty kilometres.

What was the cause of this relative slowness ? Undoubtedly the lack of roads, the difficulties in rationing and the fear of falling into a vast ambush. Because of the insufficiency of roads for vehicles the troop columns could not double up, and therefore remained strung out along the highway from Saragossa, or on a few small paths in very bad condition which cut the vast plateau extending towards the North from Toreja onward—dry, desolate, strewn with underbrush and fences of rough stones. It began to rain. The sky became overcast with huge water-laden clouds. The men harassed by the rain and the cold (the plateau is at an altitude of 1,000 metres) took refuge in the lorries. Over a thousand cars stretched out in single file along a distance of twenty kilometres.

The Air Offensive

The Reds were in no hurry. Reassured by the lack of suppleness and the heaviness of the enemy columns, they prepared their counter-

attack. The air squadrons of General Miaja—defender of Madrid, concentrated during the day of the 10th, on different aerodromes, especially at Alcala de Henares. On the 11th, one hundred planes were ready. Among them were fifty single-seater pursuit planes I.15, twenty-five single-seater I.16, ten Katiouska bombers, and lastly about twenty R.5 biplanes, specially constructed for ground attack, and carrying four inclined machine guns which allow them to fire downwards while keeping a horizontal line of flight. Each R.5 was provided with 4,400 cartridges and carried four bombs of 50 kilos as well. The I.15's also carried two bombs of 50 kilos, or sometimes a single one of 100 kilos. These projectiles were fitted with delay-fuses so that the aviator should not be a victim of his own bombs.

On 11th March, a first air attack threw the column into disorder near Almadrones. But the principal achievement was to locate the formation so as to be able to give the decisive blow the day after. In the meantime new squadrons arrived, one of Katiouskas and one of I.16's. The total of the Red air forces was thus increased to a hundred and thirty machines. Facing them were about eighty Italian and German aircraft, which the bad weather prevented being used effectively. Nearly always, they appeared too late to stop the sudden and violent attacks dropping out of the sky on the convoys. *It must be noted that these latter had no anti-aircraft defence.* The lesson of Majorca [1] had not yet borne fruit; it is true that this lesson was learned by the other side.

On 12th March, in vile weather, the aircraft fired on and bombed the second division imprisoned in its own mass on the Saragossa road. A first wave of thirty pursuit aeroplanes attacked close to the ground. A second followed, composed of R.5's, of twenty I.15's, and of fifty I.16's. These last protected the others and completed this mission, emptying their magazines before returning to their base.

It was a catastrophe. General Bergonzoli's troops were immediately stopped dead by 500 bombs and 200,000 bullets. It was impossible to thin out the formations, for the cars and trucks could not be deployed in the fields. It was impossible to turn around. It was impossible for the column even to defend itself. Flaming lorries barred the road. Those crushed by the bombs formed a barricade against the others. There was no help from their own aircraft, which could not be warned in time. The soldiers scattered over the plateau in disorder: anything was better than to remain on a road which had become a target. There-

[1] This refers to the attack launched at the beginning of the war against the island of Majorca by the General Commanding the forces in Catalonia. Eight thousand men were driven into the sea because, completely without anti-aircraft artillery, they were unable to defend themselves against the Nationalist aircraft.

upon several battalions of Red militia accompanied by Russian tanks appeared before Trijueque ; this intervention accentuated the disaster. The next day there was a new offensive by thirty Government aeroplanes. The convoy which had been trying with the utmost difficulty to get itself together was once more broken up. Retreat became a rout. The men in flight abandoned their material—guns, limbers, rifles, lorries, etc.

The two following days, the 14th and the 15th, brought a halt to all activity. The weather was still bad and the aircraft were being overhauled by the mechanics. The land forces which should have been launched in pursuit of the defeated enemy were not yet available. The Nationalists took advantage of this situation to dig themselves in. They were still in possession of Brihuega where resistance was being organized. There, on 16th March, the Red force resumed the offensive with about fifty aeroplanes, including bombers, R.5's and I.16's. A squadron of Fiats attempted to intervene, but was rapidly routed. There were new attacks on the 17th. On the 18th, five of General Miaja's brigades, including the famous International Brigade, recaptured Brihuega after its defenders had been shelled and bombed by sixty pursuit and heavy aircraft.

The role which in former times used to be assigned to cavalry in pursuit was now perfectly performed by air forces. The troops in confusion were constantly scourged by the air squadrons which in a single day, 20th March, crushed them under a deluge of 600 bombs and over 100,000 bullets. Everywhere sections of the convoys were shelled—at Almadrones, Navalpotro, Algora, Siguenza. In this last-named place, trains of supplies lined up on the tracks were violently bombed. By the 21st, it was all over. The Italians retained only a small fraction of the ground taken the first two days. Once again Madrid had narrowly escaped capture.

Reasons for the Defeat

When we examine the reasons for this result we find that they are of a material as well as of a moral order. To begin with, the beaten troops were not of the regular forces ; they were only volunteers whose fighting value, or rather professional value, was far inferior to that of regular soldiers. They were comprised mostly of men recruited in Calabria, Sardinia, Apulia, etc. Among them were unemployed, peasants without work, some demobilized men from Ethiopia, and even a crowd of cinema " extras " who had just finished the film, " Scipio Africanus." In addition the commissariat services were very deficient. On the whole, underfed men, men frozen by the wind and the rain, very likely not well commanded by officers and N.C.Os, were exposed without

defence to the most demoralizing attacks. It also appears that the command showed a certain carelessness in the organization of the operation.

Lastly, we must take into full consideration the psychological import of air attacks. We may ask ourselves if there are many troops who, paralyzed on a rectilinear route, would have been able to hold out against the hundreds of bombs and the hundreds of thousands of bullets sweeping over their position.

As far as the principle of the big motorized convoy is concerned we must insist on its startling visibility and its extreme vulnerability. During the Army manœuvres in Champagne in 1935, I was in command of a squadron reserved for the umpire service. I was thus able to fly over the battlefield a number of times. The columns of trucks and lines of tanks were unable to conceal themselves. When in movement the cars stirred up dust; when they stopped, the geometrical forms of the tanks revealed them mercilessly, even in the shade of the tree-bordered roads. In 1937, in Normandy, we saw less of them; but the very nature of the ground which helped to hide them proportionately reduced their potential efficiency.

Conclusions

The following seem to be the principal lessons to be learnt from the battle of Guadalajara :—

(*a*) Motorization pushed to the extreme limit is a mistake.

(*b*) All convoys should be equipped with strong anti-aircraft defence.

(*c*) Lorries loaded with infantry should not be sent too near the enemy unless protected by adequate natural cover to guard the secret of their movements.

(*d*) An air force should include a certain number of squadrons specially destined for battle against land troops. (Italy and Russia possess such squadrons. France, up to the present, has none.) Attacking near the ground is usually easy and fruitful.

(*e*) The vulnerability of a horsed convoy is still greater than that of a motorized convoy. It is not so much the principle of motorization which is at fault, as that of too important agglomerations of unwieldy units difficult to manœuvre. It is evident that a chain twenty kilometres long, each link of which is a car—as was the case along the road to Saragossa—is an easy prey for aviators.

THE ANTI-AIRCRAFT DEFENCE OF THE FIELD FORCE

By Brigadier A. A. S. Younger, D.S.O.,
Commander, 1st Anti-Aircraft Group, R.A.

THE threat from the air has reached such proportions that every possible means of combating it must be explored to the full. Hence the more lively interest now being taken in gun defence from the ground, the potentialities of which have long been generally regarded with considerable scepticism. The need for this interest is specially indicated in the case of the field force, not only on account of the progressive growth in the size and capabilities of the Air Arms of the nations but also because of the increasing tendency to employ the medium of the air in almost every phase of modern war.

The Air Arm can no longer, as in the Great War, be regarded merely as an excellent means of reconnaissance in certain conditions; as a super, but rather inaccurate, long-range gun; or, on occasions, as available to intervene, at considerable cost, in large-scale operations in a fighting capacity. Among its other activities we now find it able to navigate accurately in almost all weather conditions; to carry out valuable night reconnaissance; to act as a sort of "Flying Reserve M.T. Company"; or possibly to effect, by massed parachute descent, a surprise stroke or reinforcement. Many authorities, notably in Germany, also visualize its use as a "Flying Fighting Vehicle," in massed formations, to co-operate in a swift stroke with mechanized, or even other, forces. Indeed, more and more does the aeroplane tend to enter into the tactical operations of ground forces.

Hence this special interest which is forced upon us in regard to the adequate defence of the field force. It is hoped, therefore, that the following notes may be sufficiently readable to induce a wider consideration of the problem of how best to employ the Anti-Aircraft Defence Arm; remembering the immense cost in money and labour which the production and training of that arm has occasioned. It may be said that all this is obvious; if it is, then it is noticeable, on the face of it,

that many tactical exercises still take place in which probable enemy air action, and the necessary counter-measures, are considered only in a perfunctory manner. The air action of the future is, of course, difficult to assess ; and to bring it into an academic exercise requires considerable imagination ; moreover, it is perhaps natural for a " director " to find himself leaning upon the Great War as his only practical experience. There is, however, growing up a generation of Commanders and Staff Officers who are not so fettered by old-fashioned experience and who should, indeed must, look ahead, be prepared and prepare others by stimulating interest.

Many people in the Army still hold to the idea that the work of specialized Anti-Aircraft troops is a kind of " black art " ; a feeling akin to that held years ago by an old type of battalion commander in regard to his supporting artillery. The action of Anti-Aircraft artillery is, in relation to the enemy in the air, much the same as that of other artillery in regard to the enemy on the ground. The tactical employment of armoured fighting vehicles for instance has been described as similar to that of the more mobile aircraft ; if that is so, then there is at any rate a similarity in the respective actions of the Anti-Tank and the Anti-Aircraft gun. A sample of lay thought is found in a recent issue of a Regimental Journal, where the writer divides the Royal Artillery into two categories ; one is referred to as " Soldiering," the other being by inference " Non-Soldiering." The " Soldiering " category is described as that which co-operates with and supplies covering fire for other arms, but the writer did not include Anti-Aircraft artillery in this category. Will not, however, those " other arms " frequently require some form of artillery to co-operate with them and supply them with covering fire, as much in regard to their enemy in the air as on the ground ? A failure to give as much thought to dealing with an enemy in the air as when he is on the ground is reactionary ; he who does not do so will assuredly be caught out.

The Allotment of Anti-Aircraft Groups

The adequacy or otherwise of the Anti-Aircraft defence at present allotted to the Field Force is frequently discussed. The present allotment of two Anti-Aircraft Groups will have to find the only active defence in an area of operations the depth of which may reach a hundred miles or more. Over this area will spread a very considerable number of establishments upon which, with their communications, our forces will depend for their lives, quite apart from the success of their military effort ; this indicates the care necessary in considering how best to

employ the small Anti-Aircraft defence forces at the disposal of the Commander-in-Chief. This consideration will include the siting of vulnerable establishments in such a way as to reduce the number which must necessarily be exposed to the dangerous effect of air attack, and so afford a greater chance of these latter being effectively protected by such Anti-Aircraft defence troops as are available. Fortunately the field force is concerned mainly with the protection of military objectives only, and the fact that the siting of vulnerable establishments can commence to a large extent *ab initio* will help towards cutting its coat according to its supply of Anti-Aircraft defence cloth. In other words active and passive measures of defence must be carefully co-ordinated, for the more satisfactory the latter the more possible becomes the economic allotment of the former.

The Task of Anti-Aircraft Artillery

The task of Anti-Aircraft artillery is an extremely difficult one, and anything which will help towards simplifying that task will be amply repaid by the results obtained; this help can best be given by making the attacker's task as difficult as possible. The various types of enemy air action are common knowledge; they are, however, worth reconsidering, particularly from the standpoint of how to minimize demands for active defence and so to simplify the task of the Anti-Aircraft gunner.

Level Bombing.—Here the task of Anti-Aircraft gunner and Bomber pilot are somewhat similar, except that for the former the target, and for the latter the gun platform, can move in three dimensions; but when an aircraft does move in all three dimensions, while increasing the difficulties of the Anti-Aircraft gunner, it also increases the difficulty of the pilot in carrying out accurate bombing. In order to bomb accurately the pilot must fly a steady course whilst aligning his bomb sights; it is during this " run up " that the aircraft offers a particularly favourable target to the Anti-Aircraft gunner on the ground. The smaller the objective the more carefully must the bomb be aimed, and the higher the aircraft the longer will be the " run up," which may exceed forty-five seconds. Therefore the more the size of a vulnerable establishment can be reduced by dispersion the more difficult becomes the bomber's task and the simpler that of the Anti-Aircraft gunner; the degree of dispersion should be such that, even in " pattern " bombing, a miss on the target cannot score a hit on another.

Dive Bombing.—Here the pilot aims by flying direct at his objective; the great speed and short duration of attack making aimed gunfire

difficult. Dive bombing, however, should seldom come as a surprise, and weapons, placed on or close to the objective, will have a comparatively small area of air to fill with projectiles; but the nearer they are to the objective the more likely are the detachments to suffer casualties.

Low-Flying Attack.—In this form of attack, the higher the speed and the lower the height of the aircraft, the more difficult the attacker's task; but, without the benefit of surprise, attackers are liable to heavy casualties from alert defenders suitably sited. Probably the most effective weapon against dive and low-flying attack is the light Anti-Aircraft gun with its high rate of fire and muzzle velocity, but the larger nature of weapon if sited in the vicinity of the objective and firing shrapnel may also be most effective. Where small-arms fire is available it should be used to the utmost as a reinforcement to the Anti-Aircraft troops.

Gas Spray.—Such attacks may, under favourable wind conditions, be delivered from distances beyond the reach of gun defences. Moreover, a steady "run up" will be unnecessary; Anti-Aircraft defences will, therefore, often be of little value. Low-level spray attacks upon troops are, of course, similar to other low-altitude attacks, but in this case the most valuable addition to Anti-Aircraft defence will be a high degree of Anti-Gas discipline.

Reconnaissance.—Lethal attack is not the only problem to be dealt with by Anti-Aircraft troops; the hampering of enemy reconnaissance will often be more important than defence against direct attack. Reconnaissance is the most frequent form of enemy air action in the field and a prelude to other forms of action; hence it is difficult to understand why active defence against it is so seldom catered for in practice. Anti-Aircraft defence should be employed either to destroy reconnoitring aircraft or to force the pilot to alter course so frequently as to hamper his efforts very seriously. Photographic reconnaissance from reasonable heights offers to the Anti-Aircraft gun a comparatively simple target, as also does direct reconnaissance, if the pilot flies a consistently steady course, even at low heights. The light Anti-Aircraft gun is probably the best weapon against low reconnaissance, particularly when an unsteady course is flown. Such action by Anti-Aircraft artillery, if combined with a reasonable degree of local command in the air, will go far towards thickening the fog of war for an opponent. Artillery reconnaissance is a form of action against which defence is seldom, if ever, catered for. It is difficult to understand this omission, since the neutralization of our batteries is undesirable, to say the least; some form of active Anti-Aircraft defence therefore seems plainly

indicated, in order to obtain the best effect from the covering fire of our own artillery.

Varying Gun Densities

The Anti-Aircraft defence troops of the field force will be employed to defend :—

(*a*) Base ports and other installations on the L. of C.
(*b*) Rail and other communications.
(*c*) Important headquarters.
(*d*) Administrative areas.
(*e*) Troop concentrations and important movements.

In addition they may be employed against air reconnaissance or massed air action in the battle zone.

In order to acquire a reasonable immunity from bombardment or other air action an adequate gun density is required, and the allotment of Anti-Aircraft guns for a particular task depends upon the gun density considered suitable for that task. This, in its turn, depends upon the relative importance of the area to be defended. The term " gun density " refers to the number of guns able to engage a target before it can achieve its object, and is based upon the effect which can be expected from the type of gun employed, under reasonable conditions of weather, target speed, height, etc., in war. From such information as is now available, it is accepted that densities will vary from a " protective " 16-gun density for areas of the highest importance to a " harassing " 2-gun density in the case of guns sited well forward against enemy artillery reconnaissance aircraft. The actual number of guns necessary to apply a particular gun density depends upon the size of the area under consideration, for the smaller the area to be defended by a given number of guns the greater the gun density afforded by them. This once more points to the value of reducing the size of areas requiring active measures of defence. It would not be suitable, in this article, to enlarge upon the effect of modern Anti-Aircraft gunfire, but it has reached a high degree of accuracy. It may be taken that, with a " protective " density under reasonable conditions of target and weather, no single attacking aircraft can now hope to complete an average " run up " unscathed ; indeed the odds are on its being crippled.

Anti-Aircraft guns (as opposed to light Anti-Aircraft weapons) are organized in batteries of eight guns, sited in pairs (a section) or in fours. The following very approximate examples of their capabilities may be of interest :—

(*a*) Bombing ; area defence—

Number of Guns.	*Gun Density.*	*Area protected.*
8	8 ..	500 yards radius.
16	8 ..	1000 yards radius.
24	8 ..	1800 yards radius.
	(Other densities in proportion.)	

(*b*) Reconnaissance ; area defence—

16	4 ..	Square, 6 miles side.

(*c*) Reconnaissance ; route defence—

8	4 ..	6 miles, length.

Light Anti-Aircraft guns (single barrel) are sited singly or in pairs not more than about 600 yards from the vulnerable area, with one or two within the area. The density of fire should be the maximum possible on the likely lines of approach.

Flexibility of Anti-Aircraft Defence

The Anti-Aircraft equipment of the field force is mobile and has an adequate cross-country and a high road performance, except in the case of the slow-moving semi-mobile weapon employed in static defence. Hence all Anti-Aircraft defence in the field is flexible and readily adjustable according to the requirements of the situation ; the chief essentials being reasonable time for reconnaissance and for dealing with such telephone communications as are desirable in the circumstances. For example, a Searchlight Company (24 lights), the unit which needs most time for reconnaissance, can move at short notice from one lay-out to another, 60–80 miles distant, during 10–12 hours of daylight ; road speed being taken at a 10 m.p.h. average. The communications of a large static " lay-out " are elaborate and require two or three days to organize fully ; but under fluid conditions much elaboration is neither necessary nor desirable and communication will often consist of despatch riders only. It must, however, be realized that to obtain the best results in a definite defensive lay-out, advanced height finding and warning posts are necessary ; these will necessitate a telephone system. It is this telephone system which causes delay in reaching full effect after a move ; if therefore radio-telephonic equipment were provided for all Anti-Aircraft units the delay due to establishing telephone lines would be entirely cut out and the defence would reach its full power immediately the lay-out is completely occupied.

Even if every assistance is given by dispersion of vulnerable establishments combined with a high standard of small arms and anti-gas training,

the Anti-Aircraft defence troops allotted to the field force are obviously inadequate to deal with all the possible tasks enumerated above. It is therefore the province of the General Staff to lay down the priority with which they are dealt, to decide upon the general defence " lay-out " within the area of operations, and, by a wise use of Anti-Aircraft defence resources, based upon an understanding of their capabilities and limitations, to co-ordinate defence requirements with practical possibilities. This entails a decision as to the type of defence measures most suitable in each case—either passive, such as dispersion, concealment, deception, etc., or active, such as aircraft defence, anti-aircraft defence, aerial obstacles, if available, etc. It may be necessary to combine two or more of these measures, remembering that, where gun defence is concerned, the lower the gun density the less chance of defeating serious attack. Where important troop movements or concentrations are concerned it will be necessary to consider the effect of Anti-Aircraft gunfire upon secrecy, if active defence is utilized.

The Anti-Aircraft Defence Plan

Before the plan is decided upon, both the Royal Air Force and the Anti-Aircraft Defence Commanders should be consulted; the former especially as regards expected enemy air action, and the latter as to technical capabilities. To omit such consultation is to invite failure; but although this point may seem obvious, it is sometimes forgotten in practice. No active measures of defence should be decided upon until the possibilities of passive defence have been explored to the full. All countries are busy organizing elaborate home defence systems of Air Raid Precautions, the main principles of which appear to apply equally to requirements within the area of operations of a field force. The maintenance of morale among workers, protection against splinter effect, decontamination, fire fighting, etc., are all matters to be taken into account, not only at a large base but also at other establishments on the L. of C. As the defence situation changes so will these precautions also require readjustment, and it would seem that a special branch of the General Staff is indicated, if the A.R.P. organization is to be really satisfactory. The examination of passive defence possibilities might be included in the duties of such a branch, whose opinion would then be invaluable when deciding upon the general Anti-Aircraft defence plan. If this organization were agreed to, then it would be necessary to have an authority to co-ordinate the work of the two branches dealing with active and passive measures respectively; it is suggested that this authority should be an officer of such rank as would permit of

his holding executive command of all Anti-Aircraft defence organizations, and of acting as adviser to the Commander-in-Chief.

Conclusions

The following conclusions are suggested :—

(*a*) Anti-Aircraft defence troops are becoming an increasingly important component of a field force, but their handling must be constantly studied if the best value is to be obtained from them in war.

(*b*) Anti-Aircraft defence troops have reached a high standard of equipment and technical efficiency, and are fully mobile.

(*c*) The functions of Anti-Aircraft artillery do not differ greatly, in general principles, from any other artillery of the field force, and their "art," though skilled, is not "black" but perfectly simple and straightforward.

(*d*) Successful defence against reconnaissance may have far-reaching effect upon the action desired by an opponent.

(*e*) The role of Anti-Aircraft defence troops should not be confined to semi-static action at bases and railheads; they can be quickly moved to any focus of activity which requires shielding.

(*f*) An Air Raids Precautions organization is now a necessary adjunct to a field force.

(*g*) The plan of defence against air action must entail equal consideration of both active and passive measures.

(*h*) Active and passive measures of defence, A.R.P. being included in the latter, need to be organized in separate branches co-ordinated by a senior officer at G.H.Q.

THE DEVELOPMENT OF HIGH SPEED CRAFT FOR THE NAVY

By W. J. Holt, R.C.N.C.

IN order to illustrate how high-speed craft built for naval uses have developed, I will begin with a description of an early torpedo boat, comparable in size with a modern motor torpedo boat. One type of second-class torpedo boat, built about 1880, was 63 ft. in length and had a beam of 7 ft. 6 in. The maximum speed was 17 knots, and the maximum continuous speed for over two hours was 15 knots. A steam engine of 170 h.p. was fed by locomotive boilers; it was said to have been difficult to fire the boilers in a choppy sea. Of a load displacement of 12.9 tons, the hull weight accounted for 5 tons, and the engine weights 5½ tons, i.e. 70 lbs. of engine weights per horse-power developed. The endurance was about sixty miles. Two 14-in. torpedoes were carried. Subsequently the torpedo boat was overshadowed and superseded by the torpedo boat destroyer, which has gradually increased in size and its capabilities extended to such a degree that it bears little resemblance to its ancestor the torpedo boat; it is, therefore, outside the scope of this article.

The invention and development of the petrol engine, with its high horse-power in relation to engine weight, brought about, first, the motor car, and afterwards the successful aircraft. A less spectacular product of that invention was the high-speed craft using the planing principle. It is common knowledge that any more or less flat surface driven over the water at an attitude which may be described as a slight trim by the stern will derive an upward support from the water, and everyone who has been towed on a surf board behind a motor boat, or thrown a skimming stone along the water, knows that the upward lift is dependent on the size of the surface supported and the speed at which it moves over the water. The upward force for a given attitude is proportional to the square of the speed, and it has been demonstrated in practice that, generally speaking, in a boat of the planing type, if the ratio of the weight of the boat to the horse-power installed is much greater than 50 lbs. per horse-power, planing is not practicable. In the torpedo boat considered above the ratio-weight of boat/h.p. is about 170 lbs. per h.p.

About 1870 the Reverend C. M. Ramus endeavoured to interest the Admiralty in a planing type design of ship. An extensive series of experiments was carried out in the Admiralty experiment tank on models designed by him, attention being focused on full-sized ships 350 ft. in length, of 2,500 tons displacement and with engines of 1,500 h.p. The displacement/h.p. ratio of the planing design considered works out at about 3,700 lbs. per h.p., of which the engine's weights amounted to about 300 lbs. per h.p. The planing of such a design was obviously out of the question. The forms designed by Rev. Ramus were sound in principle, but no suitable engines were available in his day to drive them at planing speeds.

The development of the planing boat, driven by the petrol engine, owes much to the inventiveness of generations of the Thornycroft family and the interest taken by them in motor-boat racing. Before 1910, many models and boats had been tried out, including non-stepped chine boats, inverted V-bottom planing boats, boats fitted with so-called " mudguards " and, finally, a single-stepped hydroplane called " Miranda IV," built and raced successfully in 1910.

In 1915 a demand arose for a small high-speed torpedo-carrying boat, and a design 40 ft. in length, on the lines of " Miranda IV," was developed by Messrs. Thornycroft, and the type became known as the 40-ft. Coastal Motor Boat. These boats weighed 4¼ tons, and were fitted with an engine of 250 h.p. Speeds of 33–35 knots were attained on trials. The displacement/h.p. ratio was about 38 lbs./h.p. They carried one 18-in. torpedo.

The 40-ft. C.M.Bs were followed by the 55-ft. C.M.Bs, the lines and construction of the bigger boat being similar to those of the smaller boat. It is of interest to compare the 55-ft. C.M.Bs with the second-class torpedo boat described at the beginning of this article. Details of the more modern craft were as follows: Length—55 ft.; beam—11 ft.; h.p.—750; speed—40.4 knots maximum, and 38 knots for two hours continuous running; the armament was two 18-in. torpedoes. The displacement loaded was 12.2 tons, of which the hull weight accounted for 5.5 tons, and the engine weights 4.1 tons. The displacement/h.p. relation was 36.5 lbs./h.p., and the engine weight/h.p. relation was 12.2 lbs. per h.p. Although the hull weight of the C.M.B. showed no improvement on the old second-class T.B., the engine weight per h.p. had been reduced from 70 lbs. per h.p. in the second-class T.B. to 12 lbs. per h.p. in the C.M.B.

With the shutting down of the C.M.B. bases, no more small torpedo boats were built for the Royal Navy until about 1936. Post-war development of high-speed motor boats has seen the refinement of the

single-step hydroplane, on the one hand, for purely speed purposes, and the growth in popularity of the stepless V-bottom chine type of semi-planing runabout boat, on the other. The stepless boats have earned a well-deserved popularity, on account of their good manœuvring ability and good qualities in a seaway. At high speeds the stepless boats are generally superior to the stepped boats in turning ability. At speeds where planing has just commenced, the stepless boats do not suffer from any resistance disadvantage when compared with the single-step hydroplane, but if very high speeds are required, the stepless boat is inferior to the single-step hydroplane, and it is only by the use of abnormal engine power that high relative speeds have been obtained in stepless boats. The fast picket boats, which have been supplied to H.M. ships during the last few years, are good examples of the stepless chine boat, run at speeds suited to the stepless form.

About three years ago, owing to a fresh demand for small high-speed torpedo boats, Mr. Scott-Paine designed and built a number for the Royal Navy. They have the reputation of being good sea boats, and unusual attention has been paid to the comfort of the crew. A similar boat, designed by Lieutenant-Commander DuCane, R.N. (retired) and built by Messrs. Vosper, has also been acquired for the Service.

Earlier in this article it was stated that planing is a matter of speed; more properly it should be expressed that planing is a matter of relative speed. A 25-ft. fast motor boat planes at about 15 knots speed, but a vessel of similar shape and proportions, enlarged to the size of the "Queen Mary," would have to be driven at a speed of about 95 knots to start planing. The "yard stick" for measuring relative speed (velocity ratio) of ships of varying sizes is found in the law of similarity, and is the actual speed of the ship divided by the square root of the length, i.e. $\frac{V}{\sqrt{L}}$. Using knots and feet as units for speed and length respectively, the value of $\frac{V}{\sqrt{L}}$ for a destroyer at top speed is about 2. At this velocity ratio the destroyer form or forms, such as the war-time M.L., have considerably less resistance than any type of planing or semi-planing form. This fact has been demonstrated by actual experience and by model tank experiments.

When a velocity ratio of 3 is reached, the stepless planing boat is about the best all-round form, but for high velocity ratios, 5 and upwards, the single-step hydroplane shows a distinct resistance advantage. Incidentally, the velocity ratio of Sir Malcolm Campbell's "Bluebird"—a single-step hydroplane—at the top speed of 113 knots, was 23.

To illustrate the small amount of displacement per h.p. which is allowable in a planing boat, the table given below has been compiled, using designs of various types of ship, each type being a low-resistance example of its type.

	$\frac{V}{\sqrt{L}}$	*Displacement (lbs.)* h.p.
Cargo steamer	0.5	11,000
Fast battleship	1	1,000
Light cruiser	1.5	250
Destroyer	2	90
Planing forms	3	70
	6	29
	12	5.9
	23	2.4

A month or two ago some prominence was given in the Press to the performance of an Italian M.T.B. The figures given were 20 tons displacement, 47.6 knots speed, and 2,000 h.p. Assuming the figures are accurate, the load carried per h.p. is 22 lbs. per h.p. for a $\frac{V}{\sqrt{L}}$, probably somewhere in the neighbourhood of 6.

Increases of speed are achieved mainly by improvements in form and by reduction of the load carried per h.p.; it is proposed to discuss these two factors.

Form

There is a wide choice of forms for planing boats; among types available are the single-step hydroplane, multi-step hydroplane, stepless V-bottom chine boat, inverted V-bottom boat (sea sled), hydrofoil boats, and boats fitted with adjustable planing surfaces.

Of the types tried up to date, the least resistful form has been the single-stepped hydroplane with almost completely flat planing surfaces. Those who inspected "Bluebird" when on view in London, will recollect the almost completely flat bottom, broken only by the step. But the trouble with the flat-bottom type of single-step boat is the tendency to "hammer" under any condition of water surface except a flat calm. In the War-time C.M.Bs good performance in a seaway was achieved by giving the sections forward of the step a V shape to reduce the shock of bumping. The V shape entailed some sacrifice of resistance, but the C.M.Bs had a good low-resistance form in spite of the V shape forward. As a result of further tank experiments since the War the C.M.B. form has been further slightly improved.

Multi-step boats are said to run more steadily than single-step boats, and to be immune from the tendency to porpoising which afflicts some single-step designs.

The stepless V-bottom chine boat attempts further improvement in the sea-keeping abilities of the planing boat. The loss of the single step involves a serious increase of resistance, judged on results up to date. A well-designed stepless boat has good qualities in a seaway, although, in common with all planing boats, they "pound" when travelling dead to windward.

The inverted V type has not received much attention in this country, but has been developed in America as the Hickman Sea Sled. Advantages claimed for the type are less tendency to gripe when running before a sea, and ability to plane even with a very heavy loading. To what extent these claims can be substantiated I cannot say. Tank resistance experiments indicate that the sea sled is a true planing form. Its resistance appears to be greater than that of the single-step type, but less than that of the stepless type.

The hydrofoil idea is attractive on paper. In this type of planing boat the hull at high speeds is supported on vertical ladders of foils, which have cross sections similar to those used in airplane wings. The foils derive a lift from the water. The higher the speed, the higher the boat rises out of the water, and the fewer the number of foils on which the boat is supported. Theoretically lift/drag ratios considerably in excess of the 6/1 or 7/1 of the single-step hydroplanes are obtainable, but the theoretically good efficiency is liable to be considerably reduced by the addition of struts to support the foils and cavitation effects. Dr. Graham Bell, of telephone fame, is said to have attained speeds approaching 80 m.p.h. in a hydrofoil boat tested out on the Great Lakes during the War period.

Summing up on the subject of form. No great advances have been made in the matter of reduced resistance of the main hull during the last twenty years so far as motor torpedo boats are concerned. On the contrary, as regards resistance, attempts to lessen the bumping in a seaway and improve the manœuvrability by the adoption of stepless boats have been retrograde. Apart from the resistance of the main hull, considerable reduction of appendage resistance has been achieved in some designs, notably in "Bluebird," by gearing up between engine and propeller to reduce the size of shafts, propellers, brackets, etc.

Weight

The total weight of a planing boat may be subdivided into hull, armament, fuel, and machinery. In a given boat a maximum proportion

of weight devoted to armament and fuel, which might be described as " pay load," is the desideratum. This entails that economies in weight must be effected by reduction of hull weights and/or machinery weights.

To achieve reduction of hull weights is difficult. It was pointed out earlier in this article that although the performance of the 55-ft. C.M.B. was much superior to the old second-class torpedo boats, no gain has been achieved in the C.M.B. as regards reduction of hull weight. To anyone who had inspected a C.M.B. and observed the pains taken to eliminate excess weight in the hull, this will come as a surprise; but when account is taken of the increase of battering and punishment which the hull receives in a seaway, resulting from an increase of speed from 17 knots to 40 knots, the fact that no saving in hull weight has been effected in the later design ceases to be surprising.

Savings in weight, here and there, by the adoption of better methods of construction, the use of plywood, etc., are possible, but these gains, in a seagoing M.T.B., tend to be offset by the necessity for extra stiffening to withstand the increased battering due to higher speeds. The materials available for hull construction are mainly wood, steel, and aluminium. For small boats wood is the favourite material on account of its lightness and elasticity. Steel hulls are liable to be heavy on account of the necessity for using relatively thick plating or close frame spacing to reduce the inset of plating between frames known as panting due to the pounding of the hull in a seaway. The elasticity of wood, on the other hand, prevents inset. If M.T.Bs increase in size, it is possible that metal construction may have to be resorted to in spite of the increased weight involved.

Turning to the discussion of developments of engine design, considerable progress has been made since the War period in the direction of reduced weights. This is due, to a large extent, to the improvements effected in the aero engine in respect of h.p./weight ratio. Adaptations of the aero engine can be used in M.T.Bs, and it may be stated that engine units suitable for M.T.Bs are available nowadays having a h.p./weight ratio of less than half that obtaining in the engine of the war-time C.M.B. A gain of speed of nearly 10 knots could be achieved in smooth water by fitting a modern type of engine into a War-time type hull.

As an illustration of the weight per h.p. which has now been achieved in marine work, the engine details of " Bluebird " are worth mentioning. These were: Rolls Royce 2150 h.p., weight 1650 lbs., r.p.m. 3250 at engine, 8666 r.p.m. at propeller. Engine weight per h.p. 0.77 lbs.

From the above remarks it will be gathered that the main advance as regards increased speed of the C.M.B., as compared with the old

second-class torpedo boat, was due to the invention of the petrol engine and to the spectacular reduction in resistance at high speeds due to the use of the planing principle in boat design. The increases in speed during the twenty years (post-War period) have been due almost entirely to the development of very light-weight engines of high horse-power.

Future Developments

Apart from improvements in hull design and form, and further reductions in the weight per h.p. of the light-weight engines suitable for boats, the development of the fast motor boat depends to a large degree upon tactical considerations. In other words, what types of boats can be made to serve a useful purpose in the Navy? The early 40-ft. C.M.B. was designed to be carried by ships. It would be possible to provide a similar boat which could attain a speed of 40 to 50 knots in light weather on the same weight as the 40-ft. C.M.B. The boat could be used for raids or for scouting. A specially designed parent ship could carry a number of these boats.

As a successor to the 80-ft. motor launch used during the War, it would be possible to design a boat of planing form but not driven to full planing speed. On a length of 100 ft. a speed above 30 knots could be obtained using modern high-power light-weight engines. This boat could be given any suitable armament within limits; a load displacement of 120 to 130 tons being visualized. A boat of this type would behave well at non-planing speeds in anything but a head sea, when some "pounding" would be inevitable.

It is possible to design motor torpedo boats carrying 18-in. or 21-in. torpedoes capable of speeds ranging from 35 to 50 knots, depending upon the engine power, the size of the boat, whether a stepped or a non-stepped form is used, and the amount of weight which has to be earmarked for fuel, armour, accommodation, W/T, etc. It is possible to visualize a large planing boat, about 100 ft. in length, capable of 50 knots in a light seaway on engines of 10,000 to 11,000 h.p. The displacement would be about 90 tons.

The idea is sometimes put forward that destroyers should be given the form of planing boats, and driven at planing speeds. Assume that the guns, ammunition, torpedoes and several other items which form the usual equipment of a destroyer are retained, so that its present capability is not impaired, and also assume that the hull, machinery and capability items can be squeezed into 1,000 tons displacement and a length of about 220 ft. Suppose the craft to be driven at a planing speed of 74 knots. The h.p. of the engines would be somewhere about 142,000. Suppose we are content with the moderate planing speed of

50 knots, the h.p. becomes about 96,000. In order to squeeze anything like the powers given above into a small vessel 220 ft. in length and limit the displacement to 1,000 tons, it would be necessary to achieve big economies in weights, fittings, armament, hull, engines, etc.

One feature of planing boats which is liable to influence the development of M.T.Bs is their behaviour in a seaway. Given perfectly smooth water there is no obvious reason why a planing boat should not be driven at any speed to which the engines are capable of pushing her; but the same absence of limit to the possible speed obviously does not apply to a boat driven in a seaway of the nature of waves 6 ft., 8 ft., or 10 ft. in height with sharp crests. Reverting to the analogy of the skimming stone, if an attempt is made to skim the stone when the water is ruffled, the stone hops from one wave crest to the next instead of skimming steady over the surface. In the case of the high-speed small planing boat in steep, sharp-crested seas, it would be possible, having sufficient power, to drive the boat almost, if not entirely, clear of the water when running up a wave front facing the seas. Conversely, when running down a wave front in a following sea, it is possible to overdrive the boat so that the bow plunges bodily into the back of the preceding wave. The extreme overdriving outlined above would not occur due to the sense of danger of the officer in charge of the boat, who instinctively throttles down in a seaway, but when the planing boat is running at speed into a head sea it may, on occasion, with the incidence of a big wave, be almost out of contact with the water and will in consequence be subjected to a very heavy pounding action which has a tiring effect on the crew. Making all allowance for a physically fit and game crew, there is a time limit to their ability to withstand a heavy pounding action.

The speed which a planing boat can maintain in a seaway is dictated in an unusual degree by the state of the sea and the course relative to the sea. The amount of engine power in the boat may have little say in the matter of speed in a seaway. C.M.Bs and M.T.Bs are very good sea boats. They are fortunate in having altogether exceptional reserve of buoyancy and should be able to ride out heavy weather. The speeds at which they can run in a seaway are high, having regard to the size of the boats; but it is unlikely that, for a given size of boat, a large increase of smooth water speed will make anything like corresponding improvement in the speed in a seaway.

Apart from the effect of tactical considerations on the development of M.T.Bs, there will inevitably be development due to further engineering progress. It is not too much to hope that Diesel engines in powers and of power/weight ratios suitable for M.T.Bs will become available in a few years time. The fitting of Diesel units would reduce fire and

explosion risks and effect some saving in fuel-tank capacity. It is interesting to speculate on the powers which will be available in light-weight Diesel or petrol engines some years hence. If engines of 10,000 h.p. become available, it is possible that a re-design of the small destroyer, on planing boat lines, could be attempted, using eight units on four shafts.

As regards the hull, experiments with new forms may lead to improvements in the sea-keeping ability of the planing boat and to further reductions in the resistance of the form. If additional capability is required, it is almost inevitable that increases in size will be necessary.

The design of speed boats is, in an unusual degree, in a state of flux, and the potentialities of these craft are uncertain on account of continual and rapid developments in engine design.

OIL FROM COAL AND WARTIME SUPPLIES

IN April of last year (1937) a Committee[1] was appointed by the Minister for the Co-ordination of Defence to enquire into the production of oil from coal. The terms of reference were :—

" To consider and examine the various processes for the production of oil from coal and certain other materials indigenous to this country, and to report on their economic possibilities, and on the advantages to be obtained by way of security of oil supplies in emergency."

The following summary of the Committee's Report is reproduced from *Petroleum Press Service* of 18th February, 1938, by courtesy of that publication.

The Committee heard the evidence of a large number of witnesses, including representatives of the oil, coal, gas, shale oil and carbonization industries. It also paid visits to the hydrogenation plant of Imperial Chemical Industries, Ltd., at Billingham, and to the Government's Fuel Research Station at Greenwich where work is being carried out on various processes, including production of oil by the synthesis of gases (Fischer-Tropsch process).

The Report deals with every aspect of the question of Great Britain's supplies of liquid fuel both in peace and war and constitutes the most comprehensive review of the question of oil supplies of a particular country that has yet been given to the public, although it is to be understood that, for reasons of military security, it has been impossible to make known the detailed plans in regard to oil supplies for defence purposes. In spite of the need for reticence on this point, the Report clearly indicates the Government's general policy in this respect and the grounds on which it is based.

In the first section of the Report the Committee addresses itself to the question of the adequacy of world supplies of natural oil, and reaches

[1] The Committee, known as " The Falmouth Committee," was constituted as follows :—

Chairman : Viscount Falmouth.
Sir Amos L. Ayre, O.B.E. (Chairman of the Shipbuilding Conference).
Mr. Arthur E. Cutforth, C.B.E. (Deloitte Plender Griffiths & Co., Accountants).
Professor A. C. G. Egerton, F.R.S. (Professor of Fuel Technology of the Imperial College of Science and Technology).
Joint Secretaries : Commander A. D. Nicholl, R.N. (Committee of Imperial Defence), Mr. F. C. Starling (Mines Dept.).

the conclusion that there is little likelihood in the near future of a shortage in supplies or a substantial advance in prices.

The Report then proceeds to review in turn each of the alternative methods of supplementing imported oils by home production. It points out that the results achieved by the search for natural petroleum in this country have hitherto been negligible, so that no definite conclusion in regard to the possibility of such production becoming a factor of importance can yet be reached. The Scottish shale oil industry produced in 1936, 78,900 tons of finished liquid products, of which 48,000 tons was Diesel oil for road vehicles. The Committee considers that this production would be of some assistance in time of war in meeting the requirements of fuel for heavy road transport, but emphasises that the profitability of the industry is entirely dependent on the present preference of 8d. a gallon on oils used for road vehicles.

Under the heading of Processes for obtaining Oil from Coal, three main types are dealt with. These are, first of all, the Carbonization processes; secondly, Hydrogenation; thirdly, the Gas Synthetic process.

Carbonization Processes

It is pointed out that in the Carbonization processes, whether carried out at high or low temperatures, oil is a mere by-product. Thus, whilst the 51 million gallons of motor benzole obtained in 1936 from the high temperature carbonization of 39 million tons of coal constituted a helpful contribution to the country's needs, it amounted to only 4 per cent. of the total requirements of motor fuel. The Committee foresees the possibility of increasing the above production by a further 20 million gallons, equal to an additional 1½ per cent. of the country's present motor fuel consumption.

As regards Low Temperature Carbonization, the relative yield of motor spirit is slightly higher, being 3½ to 4½ gallons per ton of coal treated, but the possibility that Low Temperature Carbonization could under the most favourable circumstances contribute more than a small fraction of the national requirements of motor fuel is rejected in no uncertain terms. The treatment of 10 million tons of coal would result in an output of 7,500,000 tons of coke, whereas the quantity of motor spirit obtained from the gas would be no more than 30 million gallons. The 170 million gallons of heavy oil produced at the same time, and of which 60 million gallons might be suitable for use as fuel oil by the Navy, could, if necessary, be converted into light fuels, but this would require huge capital investment, and would result in the production of no more than 150 million gallons of motor spirit.

Hydrogenation

The Committee next deals with the Hydrogenation process, which, as it points out, differs fundamentally from the type of process just described, in that its sole object is the production of oil and that no residual products are obtained which compete with coal. The hydrogenation plant of Imperial Chemical Industries, Ltd., at Billingham, which commenced operations in February, 1935, produced in 1936 about 120,000 tons of motor fuel. Its estimated production for 1937 was 130,000 tons against a designed capacity of 150,000 tons. The report brings out the fact that, whilst the Billingham plant was originally intended to use coal as its only raw material, provision was subsequently made for the treatment of coal tars. Actually, as a result of certain technical difficulties which have been encountered in coal hydrogenation, less coal than was originally intended has been processed and output has been made up to a certain extent by the treatment of larger quantities of creosote and low-temperature tar.

The Committee also discusses the possibility of obtaining oil products other than gasoline by the Hydrogenation process, and states that, in the view of Imperial Chemical Industries, Ltd., good Diesel oils can be produced by the present hydrogenation process, but these are not as suitable for high speed Diesel engines as Diesel oils made from paraffinic crude oils. The cost of hydrogenated Diesel oil would be about the same as that of petrol. The cost of fuel oil, which could also be manufactured, though somewhat lower than that of gasoline, would amount to as much as £7 or £8 per ton. According to present indications, lubricating oil cannot be produced by the direct hydrogenation of bituminous coal, although the possibility of the manufacture of lubricating oils from the gases evolved in the process is being investigated.

The Committee states that the capital cost of building a new hydrogenation plant of an annual capacity of 150,000 tons, in Great Britain would be £8,000,000. The Report also points out that, if a new hydrogenation plant were constructed, it would have to be designed to use solid coal only as there are not available sufficient supplies of creosote or low-temperature tar to provide for another mixed coal and tar plant. The Committee gives its estimate of the cost of operation of a plant of this type and shows that even with the existing duty preference, profits must largely depend on what provision is made for the possible obsolescence of the plant. If provision is made for the plant becoming obsolete within a period of ten years, the final profit would be reduced to .53d. a gallon, representing only about 1¼ per cent. return on the capital invested.

I.C.I. informed the Committee that it would not be prepared, under existing conditions, to enter into any extension of its commitment in

regard to hydrogenation. Even if the existing guarantee of protection were extended the Company would not be prepared to consider adding to their hydrogenation commitments for at least another two years and suggested that, if the Government desired further development of hydrogenation by commercial interests, it would be necessary to guarantee a return on the capital invested and the recovery of such capital within the period of the guarantee.

Synthetic Processes

Under the heading "Synthetic Processes," the Committee reviews the Fischer-Tropsch Process and the somewhat similar process owned by Synthetic Oils Limited, which is being investigated in this country in a semi-commercial unit. The primary product of the synthetic processes consists of a mixture of gaseous liquid and solid hydrocarbons which requires further treatment in order to obtain the final commercial product. The Committee points out that there is no practical experience available of the working of the synthesis process on a commercial scale in this country and that, whilst a number of commercial plants have been built in Germany, the first of these did not begin operation until August, 1936. In this respect the position of the Fischer process differs from that of Hydrogenation in which there has been, both in Germany and in this country, experience of large-scale commercial operations for a number of years. Another point which is referred to is the abundant supplies available in Germany of suitable raw material for synthesis in the form of cheap brown coal, with which there is nothing comparable in this country.

With regard to the products obtained by the Fischer method, the Report points out that the gasoline is of low octane number; it can, however, be improved by cracking, though with a material reduction in the yield. Diesel oil of good quality can be made, the yield varying considerably according to the exact method adopted in treating the primary product. With regard to lubricating oils, the position remains obscure, since it was stated in evidence before the Committee that high class lubricating oils were being produced, but samples of oils supplied for test had not proved satisfactory.

The Report points out the difficulty of giving estimates of the cost of products obtained by the Fischer Process on account of the large number of possible methods of treating the primary raw material. Witnesses gave average cost figures for Fischer products varying from 12¾ pence to 15 pence a gallon. In general, the evidence indicated that the costs of production were not likely to be less than those of the Hydrogenation process. Since the cost of a 60,000-ton plant is estimated

at £3,100,000 it does not appear that the process holds any advantage over the Hydrogenation process in the matter of capital investment required.

As may be easily inferred from the details given above, the Committee's conclusion was that, so long as the price of imported fuel remains in the neighbourhood of the present figure, the case for home production of oil, judged by purely economic standards, falls to the ground.

The Committee then examines the question from the point of view of the provision of employment and reaches the conclusion that the building of oil-from-coal plants would constitute a most extravagant means of providing additional employment, since it would represent a capital investment of £1,333 per man employed, and, assuming the continuance of the present preference of 8d. a gallon, a loss of revenue to the Exchequer equal to £250 per man per annum, or £5 per person per week. The Committee's conclusions on this aspect of the matter appear to coincide with the opinion of one witness who stated that "any idea that oil from coal can provide sudden salvation for the coal industry is clearly foolish."

Oil Supplies in War

Turning next to the consideration of oil-from-coal in its bearing upon the question of security in time of war, the Committee points out that the problem has to be considered from three points of view :—

(1) The assurance of the extra supplies needed to meet war-time demand ;
(2) The effect of the policy adopted on the country's resources of man-power ;
(3) The relative costs involved.

In regard to the first of these the Committee emphasises the large number of plants which it would be necessary to build in order to supply any appreciable part of the country's war-time requirements. The building of these plants would inevitably take a number of years to complete. The Committee also calls attention to the fact that an increase in home production would necessarily cause a corresponding decrease in oil imports, and, if this decrease in imports reached substantial proportions, it would ultimately result in the reduction of the transport and distributing facilities at present provided by the oil industry. The maintenance of these facilities would, however, be of vital importance to the country in time of war, particularly in view of the means thereby provided for a rapid expansion of supplies such as could not be expected in the case of home production from a limited number of plants.

The Report effectively meets the argument that greater security would be obtained by home production as compared with reliance on imports. "It is reasonable to assume," it states, "that a large proportion of the tankers required for our oil imports would escape enemy attack. Furthermore, in the transport of seaborne oil, and also in the case of storage in this country, the risks would be spread over a very large number of units, and, though losses would be inevitable, the policy of storage and replenishment from overseas should provide adequate security for our oil requirements."

"In the case of hydrogenation plants, on the other hand, the risks would be concentrated. The plants must of necessity be large, and would therefore provide conspicuous targets and be extremely vulnerable to air attack."

The policy of home production is next examined in relation to its effect upon the question of man-power in war-time, and it is pointed out that hydrogenation plants to produce annually one million tons of motor fuel would immobilize practically 30,000 men in supplying the necessary coal and working the plants, in addition to a considerable number engaged in secondary industries, whilst, if the number of plants had to be multiplied under war conditions, very considerable additional demands on man-power would arise. From this point of view, therefore, home production is at a disadvantage compared with imported supplies.

Thirdly, the Committee deals with the question of cost and points out that to secure a production of one million tons of motor spirit annually (equal to little more than one-fifth of the present peace-time requirements of this product alone) would call for a capital expenditure of £50,000,000. The suggestion that, as against this, there would be a material saving through a reduction of the storage capacity that would be needed, is not confirmed by the Committee, which states that the storage capacity required if oil were produced at home would be very little different from that which would be necessary if the same amount of gasoline were imported. Moreover, the Committee points out that for a capital expenditure sufficient to build one Hydrogenation plant with an output of 150,000 tons of gasoline, 32 large tanker vessels could be built, which would be capable of bringing to this country in a single year 1,800,000 tons of oil products, or twelve times the output of such a plant, even at the very moderate estimate of five voyages a year.

The Committee makes a brief reference to the question of increased refining of crude oil in Great Britain in connection with defence precautions, but rejects it on the ground that the objections outweigh the advantages. Refineries offer considerable targets for hostile aircraft, and, on account of the losses in refining, throw increased burdens on the

facilities for transport of oil, besides complicating the problems of supply of the particular products required in time of war.

The Committee, therefore, as a result of their examination of all the factors involved, reached the following conclusion : " In general a policy of depending on imported supplies, with adequate storage, is the most reliable and economical means of providing for an emergency ; and they cannot recommend the reliance of the country in war time on supplies of oil from indigenous sources especially established for this purpose, unless any particular aspect of the case can be shown to be exceptional."

Notwithstanding the foregoing, the Committee recommends the grant of a guaranteed preference of 8d. a gallon for a period of twelve years from 1938, covering not only gasoline, but also Diesel oil used for motor vehicles. This recommendation is qualified by certain safeguards intended to protect the Exchequer against a decline in the duty on imported oils, and to provide for a reduction of the preference to the home producing oil industry should altered conditions render the full 8d. a gallon protection unnecessary.

The protection will, of course, be of benefit to Low Temperature Carbonization plants in common with other methods of producing oil. The Committee definitely states, however, that the grant of direct financial assistance for the establishment of further plants of this type cannot be justified. The hope is expressed that some commercial concern may find it possible to undertake the erection of a Fischer plant of not less than 20/30,000 tons capacity, so that the necessary technical experience of this process, which is lacking at present, can be obtained ; but it recommends that, if financial assistance is demanded of the Government, such assistance should be limited to the sums necessary for special items of research work which are of national necessity.

Attention is drawn in several places in the Report to the fact that the agitation for the adoption of large-scale production of oil from coal in Great Britain, as elsewhere, has been very largely the result of the adoption of this policy by the German Government, but, as the Committee points out, there are adequate reasons, both technical and economic, and, one might add, strategic, which render the position of Germany in many respects, completely unlike that of the British Empire. That the Falmouth Committee has recommended a very different oil policy for Great Britain will, therefore, cause little surprise.

WAS GERMANY DEFEATED IN 1918?

IT is nearly twenty years since the end of the Great War, and a new generation has grown up both in Germany and in this country. During that period our one-time enemy, under the leadership of Herr Hitler, has made a very remarkable recovery, and it is quite understandable that it is in keeping with the new regime that this generation should be brought up to believe that the Fatherland was never really beaten; indeed the slogans that the Germans were *unbesiegt im Felde* and *unbesiegt auf See* were started soon after the War ended. But there is a distinct element of danger for the German people in the promotion of this mistaken impression, because it might lead them to support a policy which would once more incur the active opposition of half the world in arms, and then history—true history, might repeat itself.

In this country there is a vociferous collection of pacifists who declare in season and out of season that modern war never leads to a definite decision, and that it is better not to resist an aggressor because, in the long run (how long, they do not specify) he cannot really win. Unlike the German propagandists, however, these theorists are not actuated by patriotism, but rather by fear of the moral and physical suffering which wars bring—and which under modern conditions they would be less likely to escape. Then, again, there is a small but industrious group of military writers who find it fits in with their pet theories or their petulant criticisms to assert that no clear-cut victory attended the efforts of our armed forces and the sacrifices of our people during 1914–18. These doctrinaires are more concerned with the publicity attached to professed originality and its attendant advantages than with facts and logic.

It is in no vainglorious spirit that the following essential details of the conditions in which the Allies agreed to sheath the sword in 1918 are set forth. Rather is it to remind those who have forgotten and inform those who have not taken the trouble to read, or who may have lent an ear to such perversions, that the terms of overwhelming defeat imposed upon Germany are now recalled.

GERMANY'S DEFEAT AT SEA

The "Conditions of the Armistice concluded with Germany," signed on 11th November, 1918, by Marshal Foch, Commander-in-Chief of the Allied and Associated Powers, with Admiral Wemyss, First Sea Lord, on the one hand; and Herr Erzberger, Secretary of State, President

of the German Delegation, Count von Oberndorff, Envoy Extraordinary and Minister Plenipotentiary, Major-General von Winterfeldt, and Captain Vanselow (German Navy), "duly empowered and acting with the concurrence of the German Chancellor," on the other hand; included the following clauses relating to the German navy and mercantile marine :—

(1) The surrender of all submarines.

(2) The internment of the following surface warships :—
6 battle cruisers.
10 battleships.
8 light cruisers.
50 destroyers.

(3) All other surface warships to be concentrated in German naval bases designated by the Allies, completely disarmed and placed under the supervision of the Allies.

(4) Occupation of German forts and defence works to ensure free access of the Allied navies and mercantile marine into the Baltic.

(5) Existing blockade conditions to remain, and all German merchant ships found at sea to be liable to capture. "The Allies and United States contemplate provisioning Germany during the Armistice as shall be found necessary."

(6) Black Sea ports to be evacuated by Germany, and all Russian warships seized by her to be handed over to the Allies.

(7) All merchant ships in German hands to be restored without reciprocity.

The Treaty of Peace signed at Versailles on 28th June, 1919, included the following drastic naval clauses :—

(*a*) The German navy must not exceed :—
6 old battleships.
6 light cruisers.
12 destroyers.
13 torpedo boats.

(*b*) Germany must not possess any submarines.

(*c*) The total personnel for the fleet, coast defence stations, etc., must not exceed 15,000, of which not more than 1,500 may be officers.

(*d*) All German surface warships not in German ports cease to belong to Germany, and those interned are finally surrendered.

(*e*) The following (further) surface warships to be surrendered :—
8 (modern) battleships.
8 light cruisers.
42 modern destroyers.
50 modern torpedo-boats.

(*f*) All surface warships now under construction to be broken up.

(*g*) All German submarines, submarine salvage vessels and docks for submarines to be handed over.

(*h*) Replacement tonnage of warships, recruiting and training for the German navy to be rigorously limited.

(*i*) Arrangements for minesweeping, prohibition of specified fortifications, and regulations governing the use of wireless were other clauses in the Treaty.

In effect, from being a first-class naval Power, Germany was reduced to a position of almost complete impotency at sea, and became dependent mainly on the Allies for sufficient shipping even to import the bare necessities of life.

During the past twenty years she has, by agreement with Britain, built up a useful and very modern navy of which she may well be proud, and a fine new mercantile marine ; nevertheless, it is a mistake to ignore the fruits of Jutland, the stranglehold of the Allied fleets all over the world, and the price Germany had to pay on the seas before she was given peace.

THE DEFEAT OF THE GERMAN ARMY

For the even more drastic military conditions imposed on Germany by the Terms of the Armistice and the Peace Treaty, the student is referred to the official records of those documents ; but as it is in connection with the termination of the War on land, rather than that at sea, that so many mis-statements are so frequently made and so many false conclusions drawn, it will be even more convincing if representative Germau views on the situation at that time are recounted.[1]

Those who wish to read the whole story of the end of the War on land as recorded in German documents will find it in the Report of the Reichstag Enquiry into the Loss of the War, printed as *Die Ursachen des Deutschen Zusammenbruchs im Jahre* 1918, can read the documents in *Urkunden zur Vorgeschichte des Waffenstillstandes*, and discover corroborative evidence in the memoirs of the principal actors, particularly those of Erzberger, the leader of the Armistice delegation ; whilst a glance at

[1] The ensuing review has been contributed by Brigadier-General Sir James E. Edmonds, C.B., C.M.G., D.Litt.

the map, "British Battles during 1918 (8th August—11th November)," will show graphically the succession of victories in which our opponents were hustled back, losing, besides a vast extent of territory, in prisoners and material :—

	Men	*Guns*
To the British	188,700 ..	2,840
„ French	139,000 ..	1,880
„ Americans	48,800 ..	1,424
„ Belgians	14,500 ..	474
	391,000 ..	6,618

The above figures are fair evidence of military victory on one side and defeat on the other. Moltke II, deprecating the Kaiser's premature "hurrah shouts" of victory in August, 1914, said, "when there are victories there are prisoners and captured cannon." The *Statistisches Jahrbuch* of 1921–22 gives the German net loss in killed and wounded in the whole year 1918 as 885,711; so the number of prisoners in only 3½ months of this period, in proportion to battle casualties, is extraordinarily high. The greater, therefore, is the victory.

General von Kuhl (Crown Prince Rupprecht's Chief of Staff and first technical assistant to the Reichstag Commission of Enquiry) would date the difficulties of the German Army from the Passchendaele battles. (See his *Weltkrieg* ii, p. 131.) This campaign had exhausted the German reinforcements "so that for 1918 there remained only Class 1899 (18-year-old recruits), convalescents and men from the Eastern Front." These reinforcements were on all hands reported as not worth much. "The hitherto sharp German sword now had notches in it," Kuhl sums up and begs that this shortage of men should be borne in mind in considering the events of 1918.

It was this aspect of the situation which Crown Prince Rupprecht brought to the notice of the Reichschancellor in a letter dated 1st June, 1918, after the three German offensives of the 21st March, 9th April (Lys) and 27th May (Chemin des Dames). He wrote :—

> "However favourable our military position is for the moment, we are suffering from two evils for which there is no remedy, the shortage of reinforcements and of horses which has gradually arisen and must ever go on increasing."

In his opinion, the time had come to open peace negotiations.

His hint was taken. On the 3rd June, Colonel von Haeften, O.H.L.[1] liaison officer in the Ministry of Foreign Affairs, laid before Ludendorff a

[1] General Headquarters.

proposal for "a German political offensive" to obtain peace, and on the 18th June it was brought to the knowledge of the Chancellor, and he was informed that "O.H.L. itself had openly given up the idea of a purely military conclusion of the War" (*Helfferich*, iii, pp. 417–8). The principal difficulties in the way of peace were that Ludendorff wanted to secure new frontiers which would be good "jumping-off" lines for the next war, and did not wish to give up Belgium, and that both political and military authorities feared that the initiation of peace negotiations would, rightly, be interpreted as a sign of weakness. When, on the 24th June, Kühlmann, the Secretary of State, said openly in the Reichstag that peace conversations were necessary and that "an absolute end to the War could hardly be expected by a purely military decision alone without any diplomatic action," he was forced to resign, and Ludendorff, on the 25th June, forbade Colonel von Haeften to take further part in a "peace offensive."

The long series of defeats in the next three months, beginning, respectively, on the 18th July (General Mangin at Soissons), 8th August (the "black day" for Ludendorff), 21st August (Albert), 26th August (Scarpe), 31st August (Kemmel evacuated), 2nd September (Drocourt-Quéant), 12th September (St. Mihiel and Havrincourt), 18th September (Épehy), 26th September (Champagne and Argonne), 27th September (Canal du Nord), 28th September (Ypres, Messines retaken), 29th September (St. Quentin Canal), gradually broke Ludendorff's stubborn spirit. It was no longer a question of obtaining even a "draw"—defeat was staring him in the face.

The defeat of the 8th August, he wrote, "confirmed the decline of our fighting powers," and on the 11th August he admitted to the Kaiser, "we have suffered a severe defeat"; of the state of the Armies on the 25th August he reported:—

> "The spirit of the troops is falling, the high number of prisoners shows that our lines are brittle (*brüchig*). . . . By a wide margin, the loss of men can no longer be covered. I must always be disbanding more and more divisions, and those which remain are falling in fighting strength."

After consultation with Hindenburg, he wrote:—

> "The War has now been lost and nothing can alter it. Had we had the means to change the fortune of war in the West, naturally it was not yet lost. For this the means failed."

In September, matters had gone from bad to worse, and on the 27th Bulgaria had asked the Entente Powers for an armistice. On the 29th, at the Council of War at Spa, at which all the highest political and military authorities were present, Ludendorff declared that "the

condition of the Army demands an immediate Armistice," He left it to the political authorities to obtain one.

The Chancellor, Hertling, resigned, and Prince Max of Baden took his place. He asked in writing four significant questions of Ludendorff. The third was, " Is the military situation so critical that action must be begun at once with the object of obtaining an Armistice and peace? " The fourth was: " If the answer to 3 is in the affirmative, is O.H.L. aware that the beginning of a peace move under pressure of military necessity may lead to loss of German colonies and German territory, notably Alsace-Lorraine and the purely Polish districts of the Eastern provinces? "

Hindenburg replied in writing on the 3rd October that " O.H.L. adheres to the demand of Sunday, 29th September, for the immediate publication of the peace offer to our enemies." It is now suggested that Hindenburg and Ludendorff took this step, not because of defeat, but from fear of defeat. But Ludendorff had already admitted defeat.

Of the actual state of the Army at the time Crown Prince Rupprecht has left a record in a letter addressed to the Chancellor on the 18th October :—

> " The troops," he said, " are overtired and shockingly shrunk in numbers. In some Armies 50 per cent. of the guns are without teams and ammunition is failing. Regular officers, except for regimental [our brigade] commanders, are only to be found in the higher staffs. The morale of the troops has greatly suffered and their power of resistance is steadily decreasing ; the men surrender in flocks on enemy attack, and thousands of marauders prowl around the lines of communication. . . . We have now no more defensive positions and are not in a state to construct more." The Americans, the Prince continued, were arriving 300,000 a month. " A catastrophe might come in a single night."

General von Kuhl laid similar statements before the Reichstag Commission.

The Chancellor opened negotiations with President Wilson—the Reichstag Commission found that the Government did all they could to delay the sending of the demand for an Armistice—and on the 5th October he informed the Reichstag of what he had done. " The sudden drawing aside of the curtain of the picture of the true situation made a dreadful impression " (Colonel Schwartfeger, like Kuhl, technical assistant to the Commission). It was the hoisting of the white flag, admission that Germany's military power was broken and the Allies recognized it as such. It has been said by a German poet that his countrymen are " either bounding high to heaven or depressed down to hell," and this proved true in 1918.

Political strife in Germany, which had ceased on the outbreak of war and had not reopened until Ludendorff had forced Bethmann Hollweg from the Chancellorship in July, 1917, grew fiercer and the balance turned to the left.

Ludendorff, having washed his hands of politics, demanded more men, which could not be furnished. At the same time he begged his Armies to hold fast to their positions so as not to prejudice the peace negotiations. This, owing to unceasing Allied pressure, they were unable to do, being hammered in the continuing battles of the Canal du Nord, Ypres, St. Quentin Canal, Champagne and Argonne, and the new battles of the Beaurevoir Line (Bellenglise), Cambrai and the Selle, with the loss of Armentières, Lille, Ostend, Zeebrugge, Bruges, Laon, La Fère; and he had to tell them that he had no reserves. On the 26th October, seeing all was lost, and determined to keep his name out of the capitulation, after blaming the Government for carrying out what he himself had demanded, Ludendorff resigned. On the next day Austria-Hungary asked Italy for an Armistice, and in their fourth Note to President Wilson the German Government repeated the request of the 5th October for an Armistice, which the Allies decided on the 4th November to accord; but the acceptance and conditions do not appear to have reached Berlin until the night of the 6th–7th, and on the 6th General Groener (Ludendorff's successor) had told the Chancellor:—

> "We shall have to cross the line with a white flag. Even a week is too long to wait."

As his successor could say this, there was evidently good reason for Ludendorff's earlier demand. After three months of retreat, the German General Staff knew only too well—as every military psychologist knows—that apart from other factors, the troops having got accustomed to march in one direction, there was small chance of persuading them to reverse it.

Meantime an agitation to sacrifice the Kaiser in order to obtain better conditions for the Army was in progress, and on the 3rd November (that is a month after the original request for an immediate Armistice had been made) the naval mutiny began to take shape at Kiel, although red flags were not hoisted on the ships until the 5th. The Allies were approaching Brussels and Sedan, and, if negotiations failed, the great French strategic offensive, under General Mangin, in Lorraine in the direction of Luxembourg–Longwy, to cut off the retreating Germans between Luxembourg and the Dutch Limberg appendix, was ready to be launched on the 13th, the signs of which were clearly visible to the German General Staff.

Armistices in the field are usually made between the commanders. In their formal notification the German Government had named General

von Gündell of the General Staff as head of the delegation. But when the delegates appeared the General was not amongst them. Determined to lose no time in launching the legend that the civilians not the soldiers had demanded the Armistice, the General Staff kept Gündell back, and Erzberger, a civilian Secretary of State, announced himself as head of the delegation; the Army and Navy were represented by two junior officers, the liaison officers of the General Staff and Admiralty Staff attached to the Chancellor's office.

When the terms demanded by the Allies were communicated by the Government to O.H.L., Hindenburg, in writing, suggested that endeavour should be made to reduce the severity of certain articles, but he added:

> "In case these points cannot be obtained, the Armistice must nevertheless be signed."

That is, the Army was beaten and ready to capitulate on any terms. Erzberger, in fact, has stated in his Memoirs that he was instructed to accept any terms, even unconditional surrender, and that O.H.L. "was surprised at the success which had been obtained." The General Staff, viewing the situation from their own standpoint, expected their adversaries to demand unconditional surrender and the partition of Germany, besides the handing over of the Colonies, perhaps even harder terms—a German professor has laid down what they should be: "the permanent subjection in a state of powerlessness of the beaten enemy." (Banse, in his *Raum und Volk*.)

In the last days the fighting powers of the German troops have been described by British officers as "patchy": a few divisions were still fighting well, the troops of others either surrendered or fled, leaving their machine guns in position. The German Army was visibly beaten in the field and the Staff and troops knew it. It cannot be doubted that had the operations continued, General Mangin, assisted by the Independent Air Force, would have cut off the remnants of the German Army, short of ammunition and with the roads and railways behind it blocked with transport, just as Field Marshal von Moltke had headed off Macmahon at Sedan, and there would have been a similar surrender in the open field. The wars of 1864, 1866, and 1870–1 ended without such a spectacular surrender, yet it has never been argued that the Danes, Austrians, and French were not beaten.

Had the young authors who think that Germany was unbeaten had as much experience of war as they have skill in writing, they would have recognized the difference between the orderly German retreat, with a sting in its tail, to the Hindenburg Line in 1917, and that from the Soissons Salient in July, 1918, when hardly a prisoner was taken, and the desperate plight of the ever-weakening resistance, leaving hundreds

of thousands of prisoners behind, in September–October, 1918. Without reserves, there cannot be a successful defence, and the Germans had no more.[1]

THE ABOLITION OF THE GERMAN AIR FORCE

The Terms of the Armistice included a demand for the surrender in good condition of 1,700 aeroplanes (" fighters, bombers—firstly all the D.7s—and all the night bombing machines "). Also " All Aerial Forces are to be concentrated and immobilized in German bases to be specified by the Allies and the United States of America."

In the Peace Treaty it was laid down that " the armed forces of Germany must not include any military or naval air forces." No dirigible might be kept. The personnel of the air forces of the German land and sea forces had to be demobilized. For six months the manufacture and importation of aircraft, parts, and engines were forbidden. Materials of every kind connected with the housing, maintenance, arming and equipment of aircraft had to be delivered up.

SUMMARY

In short, Germany was deprived of her navy except a nucleus of old ships, her army was reduced to a police force, and her air force was completely abolished. She lost Alsace Lorraine and all her Colonies, and had to submit to a corridor being driven through her country from Poland to the sea, cutting off East Prussia. She was forbidden to have any fortifications either on the left bank of the Rhine or on the right bank to the West of a line drawn 50 kilometres to the East of the Rhine. Government of the Saar Basin (the centre of the German coal field) was entrusted to a League of Nations Commission. The Ruhr was occupied by an Allied army. Finally, " . . . Germany accepts the responsibility of Germany and her allies for causing all the loss and damage to which the Allied and Associated Governments and their nationals have been subjected as a consequence of the war imposed upon them by the aggression of Germany and her allies."

The foregoing is but the barest outline of the sentences passed on our principal enemy at the end of the Great War; but they should suffice to show that if the word means anything, Germany was well and truly *defeated*. Our Prime Minister has recently remarked " in war there are no winners." Be that as it may, it behoves us to take to heart this object lesson of what is the fate of the *losers*.

[1] For Sir Douglas Haig's " Appreciation of the Situation " on the morning of 11th November, 1918, see the JOURNAL for August, 1937, p. 528.

THE INTERNATIONAL SITUATION

BRITISH FOREIGN POLICY

INTEREST throughout the world and the anxiety of the public at home as to the attitude of our Government towards recent national events have caused a general stocktaking of our commitments and a restatement of British foreign policy. It will be of interest briefly to review those events and to note how they have influenced the decisions which have been arrived at.

As was remarked in last quarter's JOURNAL, the year opened with rather better relations between most of the major Powers than had existed for some time; but it was obvious that a sense of lurking suspicion, if not of latent enmity, remained as between Britain on the one hand and each of Germany, Italy and Japan on the other. It was only common sense to examine these liabilities and see whether it was possible to liquidate at least one of them; and that, clearly, is what the Prime Minister has been endeavouring to do.

A favourable start towards a better understanding with Italy, made soon after he took office, was interrupted by certain incidents in the Mediterranean, and by that country's notification on 11th December last of her intention to withdraw from the League of Nations. Relations deteriorated and, as Mr. Neville Chamberlain has stated, " . . . suspicion was growing in Rome that we did not want conversations, and that we were engaged in a Machiavellian design to lull the Italians into inactivity while we completed rearming with the intention presently of taking revenge for the Italian conquest of Abyssinia." The result was movements of troops on their part and a sense of renewed animosity on both sides—" a vicious circle," as the Prime Minister called it.

But on 10th February the Anglo-Italian situation took a turn for the better. In the light of later events, it is pardonable to wonder whether Sgr. Mussolini already knew of Herr Hitler's intention to advance into Austria, and felt that the Rome–Berlin axis was becoming a bit unbalanced. Be that as it may, the Italian Ambassador called at the Foreign Office to say that his Government " was ready at any time to open conversations with us." There then began a curious conflict of opinion between Mr. Eden, who as Foreign Secretary had been used to a fairly free hand in dealing with foreign affairs, and Mr. Chamberlain, who as Prime Minister is ultimately responsible under our constitution

for our foreign policy. The former wanted to secure certain guarantees from Italy before entering into conversations; the latter considered it would be unwise to rebuff this display of good will.

On 21st February the Italian Government made it known that they accepted the British formula concerning the withdrawal of volunteers from Spain and the granting of belligerent rights. The British Cabinet thereupon decided to proceed with the conversations. Mr. Eden, feeling that he was being overruled, resigned. He was succeeded at the Foreign Office by Lord Halifax. This change was not without its political repercussions, and then and since opportunists have sought to make party capital by representing that it marked a fundamental alteration in British foreign policy.

Hardly had excitement over what was really very largely a domestic affair begun to calm down before it rose again to fever pitch as the result of the German invasion of Austria on 13th March. Once again there was a call for a statement of our Government's foreign policy in the light of this new aggression by a dictator, and once again there was a clamour that the authority of the League should be invoked. But the lessons of the Abyssinian crisis could not be ignored, and it was quite obvious that the only result of dragging the League into the picture would be to add to that body's humiliations.

The Prime Minister refused to be hurried. Doubtless one of his pre-occupations was to test the reactions of the Dominion governments to the new situation. But on 24th March he made a very clear pronouncement in the House of Commons of the line which the Government would take. The following were the essential points in his speech:—

(1) We are bound by certain treaty obligations which would entail on us the necessity of fighting if the occasion arose.

(2) There are also certain vital interests of this country for which, if they were menaced, we should fight—for the defence of British territories, and the communications which are vital to our national existence.

(3) There are other cases in which we might fight if it was a case of doing so or of abandoning all hope of averting the destruction of those things we hold most dear—our liberty, and the right to live our lives according to the standards which our national character have prescribed for us.

(4) The policy of collective security has failed to prevent war, to stop war, or save the victims of aggression. Collective security might be made to function in the modified form of what, in effect, would be the old system of military alliances.

(5) Germany has profoundly disturbed international confidence by her action in regard to Austria.

(6) Our existing commitments as regards the use of our arms for purposes other than our own defence and that of other parts of the British Commonwealth of Nations are, first of all, the defence of France and Belgium against unprovoked aggression. Also we had obligations to Portugal, Iraq, and Egypt.

(7) H.M. Government would not enter into a further commitment which would *automatically* require us to aid France in implementing the Franco-Czechoslovak Treaty; but the pressure of facts might cause this and other countries, not at present directly concerned, to become involved.

(8) Non-intervention has been and will continue to be Britain's policy in regard to Spain, as being the best method of avoiding a major conflagration.

(9) Acceleration of the existing plans for rearmament has become essential, especially in regard to the Royal Air Force and our anti-aircraft defences.

In the view of the Government "the knowledge in all parts of the world that such steps are being taken with determination and despatch will be a valuable contribution towards international reassurance."

THE GERMAN OCCUPATION OF AUSTRIA

FOR some considerable time Austria has been very unstable, politically. Amongst the numerous warring factions, the Nazi party had become increasingly strong and vociferous; it, naturally, enjoyed the moral support of Germany. On 12th February, Dr. von Schuschnigg, the Austrian Chancellor, went to Berchtesgaden to meet Herr Hitler and discuss the working of the Austro-German Agreement of 11th July, 1936. In a subsequent official *communiqué* it was announced that ". . . both parties were resolved to hold fast to the fundamental principles of the Agreement and to regard the same as the point of departure for a satisfactory development of the relations of the two States." Allusion was also made to "the immediate execution of measures to guarantee the establishment of an intimate and friendly mutual relationship between these two States. . . ." By the terms of the Agreement the German Government recognized the full sovereignty of the Federal State of Austria. But, when the crisis came, both this and the *communiqué* became mere "scraps of paper." At 10 p.m. on 11th

March, German troops crossed the frontier at Salzburg, Kufstein and Mittenwald. The following day they occupied the cities of Graz, Linz, and Innsbruck, and, as if to make quite sure that there would be no doubt about Italy's neutrality, a detachment was posted on the frontier at the Brenner Pass.

Hitler can claim that this military occupation of Austria took place at the express wish of that country's own spokesman, the Minister of Security and Interior—Dr. Seyss-Inquart, who in the name of the provisional government had addressed an urgent request to the German Government for the despatch of German troops at the earliest possible moment " to support it in its task and to help it in preventing bloodshed." But history must also record that Hitler had metaphorically placed a pistol to the head of Dr. von Schuschnigg during his visit to Berchtesgaden and compelled him to remodel the Austrian Cabinet and to include in it Dr. Seyss-Inquart and another powerful Nazi representative.

On 9th March, the Chancellor took a step which precipitated the crisis and played into Hitler's hands when he announced that a national plebiscite would take place on 13th April to " show before God and the world and before the whole German people that we are ready to affirm our independence, the German independence of Austria." In a speech he also said that " threats and menaces by National Socialists . . . cannot be tolerated." Dr. Seyss-Inquart flew to Berlin the next day.

On 11th March, events moved rapidly and dramatically. The Minister of Security returned from Germany with an ultimatum demanding the immediate postponement of the plebiscite within twenty-four hours, also the cessation of talks which the Chancellor was engaged in with worker-representatives and which seemed to be aimed at a restoration of trade union and other working-class activities. Dr. von Schuschnigg agreed to postpone the plebescite but rejected the other demands. There followed a second ultimatum which the Chancellor was given until 7.30 p.m. to accept; this required (1) his instant resignation, (2) the installation of Dr. Seyss-Inquart as Chancellor, (3) A two-thirds majority of National-Socialist Ministers in a new Cabinet and other measures which would ensure Nazi domination. Just as the time limit was expiring Dr. von Schuschnigg broadcast in Vienna his resignation. Austrian Nazis poured into the streets and took possession of the city. Dr. Seyss-Inquart broadcast to the Austrian nation, an appeal for the maintenance of law and order, followed, at 9.30 p.m., by his request to Germany to support him. Within half an hour German troops, who had been waiting for the word, marched over the frontier: Austria became part of " Greater Germany."

The diplomacy and staff work of this latest piece of " aggression " can only be described as masterly. Could democracy, much less the League of Nations, move as surely and as swiftly ?

THE SPANISH CIVIL WAR

ON LAND

GENERAL FRANCO'S advance, which had been arrested by the loss of Teruel early in January, 1938, has been resumed on the Aragon front. Strong reinforcements, set free by the capture of the Asturias, arrived from the North, and a counter-offensive was launched on 25th January. This offensive succeeded in recapturing several important tactical features, including the dominating hill known as the " Tooth of Teruel." The Government forces, however, retained their grasp on Teruel itself. Further attacks, directed by General Franco in person, continued for nearly a month. Yard by yard the Government troops gave ground. Bitter winter weather added to the hardships endured by the troops of both sides and pressed with special weight on the offensive preparations of the Insurgents. However, on 22nd February, Franco's troops re-entered the battered ruins of Teruel in triumph and announced the capture of thousands of prisoners and rich booty in war material.

After a pause for consolidation, the Insurgent Southern Group, organized in three Army Corps, the Moroccan Corps (General Yague), the Italian Corps, and the Aragon Corps (General Moscardo)—in that order from North to South—continued their offensive in Aragon along the axis Saragossa–Alcaniz, South of the River Ebro, with the sea coast as their ultimate objective. During the period 10th to 16th March they made astonishing progress and captured the town of Alcaniz, about 2000 square miles of Government territory, including numerous villages, thousands of prisoners and large dumps of munitions.

The morale of the Republican troops in this sector, who had received severe punishment in the two battles of Teruel, seems to have been at a low ebb, and their resistance merely perfunctory. The " Black Arrow " and " Blue Arrow " formations of the Italian Corps, however, who are reported to have fought particularly well on the Insurgent side, lost over 150 officers and 1,500 men killed and wounded.

Caspe, an important centre of road and rail communications, fell to General Franco's troops on 17th March, when the Government rear-guard, composed of the 15th (French) International Brigade, was practically wiped out by the 5th Navarrese Brigade. The Government

forces, however, succeeded in stabilizing the front in this sector along the general line of the Catalan–Aragon frontier.

A fresh offensive was launched by the Insurgents on 22nd March, North of the River Ebro, where the Northern Group, comprising the two Army Corps of Navarre (General Solchaga) and of Galicia (General Aranda) struck hard along the axis Huesca–Lerida. This attack seems to have come as a surprise to the Government troops, many of whom were captured without offering much resistance. Government Headquarters at Barcelona possibly failed to appreciate the fact that General Franco's forces were now so strong that he was able to attack along two different lines at one and the same time.

On 23rd March the Insurgents assumed a general offensive all along the line with five Army Corps, totalling over 200,000 men. The Moroccan Army Corps, forming part of the Southern Group, forced the passage of the River Ebro from South to North and effected a junction with the Galician Corps, belonging to the Northern Group of Insurgent Armies. The Government forces offered an ineffective resistance and seemed to be completely demoralized. Various divisions, composed respectively of Anarchists, Socialists and Communists, were thrown in to stem the Insurgent advance, but, lacking all sense of unity amongst themselves, they failed to carry out their task. On 26th and 27th March, the Government troops actually retreated twenty miles in forty-eight hours. Next day the Navarrese Army Corps entered Barbastro, an important centre of communication in northern Aragon.

IN THE AIR

During the period under review the Insurgent aircraft, which have displayed a marked superiority over their Government opponents, have been utilized in two main ways: firstly, to support the attacks of divisions of all arms by an intense air bombardment of positions about to be assailed; and secondly, by air action against civilian centres of population, with a view to reducing their morale. As an example of the first method, over two hundred Insurgent aircraft are reported to have been in action in support of the Galician Army Corps during the offensive on 28th March, in the Lerida sector. Aircraft employed in this way are able to isolate the defenders by taking air action against their reserves and rearward communications, thus preventing reinforcements or supplies from reaching the front; and by bombing to shake the nerve of the troops actually holding the line. On the whole, this method has proved to be extremely fruitful.

The second method has been utilized extensively against towns and

villages in Government territory, and in particular against Barcelona, a city of 1,150,000 people. During the three-day period 16th to 18th March no less than eighteen Insurgent air raids were directed against the town, which, in the absence of efficient anti-aircraft defences, was systematically bombed, sector by sector, from a height of from 15,000 to 20,000 feet. Civilian casualties, including women and children, were returned at 875 killed and about 2,000 wounded, which works out at roughly one casualty per 380 inhabitants.

The Prime Minister—Mr. Neville Chamberlain, has expressed publicly his " horror and disgust " at this ruthless destruction of human life, and H.M. Government, in conjunction with the French Government, despatched a strong note of protest to General Franco. The latter, however, replied that, while he recognized the humanitarian motives which inspired the protest and regretted the loss of innocent lives, Barcelona constituted an important military objective owing to the number of factories, industrial undertakings, and military concerns within the confines of the city. He would continue to endeavour to restrict aerial activity in towns and would only employ such means when military necessity left no alternative.

This phraseology is worth noting, because something of the kind may well become the formula used to justify the bombing of towns and cities in future warfare.

AT SEA

In the latter part of January there was a recrudescence of attacks on shipping in the Mediterranean, and it was evident that Insurgent submarines were again becoming active. A number of British ships were attacked, some were sunk, and in certain cases there was loss of life. As a result, on 5th February the British Government warned both parties in Spain that H.M. ships had been instructed to attack all submarines found submerged outside Spanish territorial waters and anywhere within the zones allotted to British patrols by the Nyon Agreement. The other two Powers signatories to that Agreement—France and Italy, intimated their intention to take similar action within their areas. These measures appear to have been effective.

On 22nd February, Sagunto and Valencia were bombarded by the Insurgent cruisers " Canarias," " Baleares," and " Almirante Cervera."

The Government navy, which for some time had been singularly inactive, suddenly came to life on the night of 5th–6th March. Supported by the cruiser " Libertad," three destroyers, at 2.15 a.m., made a spirited attack on the Insurgent ships off Cartagena. The 10,000-ton cruiser " Baleares " was hit by three torpedoes, and sank with the loss of some

600 officers and men. Rear-Admiral Vierna was amongst those who perished.

The rest of the Insurgent squadron scattered and the only survivors were picked up by H.M. ships " Kempenfelt " and " Boreas."

THE SINO-JAPANESE WAR

NO military operations of a decisive character have taken place in China during February and March, 1938. The Chinese forces, however, defending the general line Chengchow–Kaifeng–Suchow have been hard pressed and their strategical position in the Suchow area has at times been precarious. Japanese columns have advanced along three main lines: Sinsiang–Chengchow, Tsinan–Suchow, and Pengpu–Suchow. Owing to the pressure exerted by the first of these columns, the Chinese have been compelled to blow up the three-mile long viaduct carrying the Peking–Hankow railway across the Yellow River, North of Chengchow. The maintenance of a successful defence in this sector is, indeed, vital to them as the only organized line of retreat open to the Chinese masses in the Suchow area is westwards along the railway through Kaifeng and Chengchow.

The Chinese Higher Command, however, have no intention of fighting a decisive battle in this or in any other sector of the battle-front. According to an interview granted to a correspondent of the *Deutsche Allgemeine Zeitung* at Hankow, Marshal Chiang Kai-Shek—the Chinese Generalissimo, declared that he hoped to carry on the war in the interior of China over an indefinite period. Provided that a steady supply of foreign munitions could be assured, the Marshal was confident that, finally, he could exhaust the Japanese strength. The wide extension of the fighting fronts and the distance of the Japanese bases from one another, gave, he said, important advantages to China. Guerilla warfare, which had been extensively organized against the lengthy Japanese lines of communication, would, he considered, multiply Japanese difficulties. Special troops of high quality had been allotted to this task, but guerrilla warfare would, he declared, never lead to decisive results. Ultimately a counter-stroke would be launched with the object of driving the Japanese into the sea. The time for this, however, was not ripe.

The Marshal expressed satisfaction at the supply of munitions and explained that there were several alternative routes of supply from abroad. According to the latest advices these include:

(*a*) The Western route, from Soviet Russia via Sinkiang–Sianfu to Honan. This route runs partly by road and partly

by rail. The road sector exceeds 1,500 miles in length from Soviet railheads in Kazikistan to the western terminus of the Honan railroad. The roads are believed to be passable by M.T. in fair weather only.

(*b*) An alternative western route from Yunnan to Burma. This channel of communication will be by road only, and is being constructed by mass labour under difficult conditions of ground. The time of completion is unknown.

(*c*) The south-eastern route from Canton to Hankow by rail. This line of supply provides the shortest and best communications, but has the disadvantage of liability to blockade from the sea by Japanese naval forces. According to the Japanese Prime Minister—Mr. Hirota, no important supplies of munitions have reached China from Great Britain by this, or any other, source.

(*d*) The southern route from Hanoi, in French Indo-China, to Yunnanfu by rail, and thence some 700 miles eastwards to Changsha by motor convoy.

Compared with the above, the Japanese communications by sea with their munition factories are short, easy, and free from interruption by possible enemy action. The Japanese forces in China, moreover, are believed to include but few troops belonging to the first line. The bulk of these latter, it is understood, are being retained in reserve at home or in Manchukuo, ready for any eventuality either inside or outside China. In the absence of foreign intervention, therefore, these and other factors assure great staying power for Japan and render the successful development of China's war plans both problematical and distant.

At the end of February, General Matsui, the Commander of the Shanghai area, and two of his Divisional Commanders—Lieutenant-General Prince Asaka and Lieutenant-General Yanagawa, were recalled to Japan by the order of the Emperor. The official reason given was that the principal task of the Army was over and that reorganization for warfare of a different nature was contemplated.

The Japanese claimed important successes in Shansi on 7th March, when they declared that they cleared the Chinese troops out of this province. Chinese guerrillas, however, penetrated to within forty miles of Pekin and cut the railway South of the city.

The battle of Suchow, which had been raging for about a fortnight, entered, on 27th March, on its final phase when Chinese reinforcements, under the leadership of General Li Tsung-Jen, strongly counter-attacked Japanese forces North and East of the town. The Chinese forces,

including some mechanized troops and supported by aircraft, recrossed the Grand Canal at two points and recaptured several villages on the Tientsin–Pukow railway. Some thousands of Japanese are reported to have been encircled, and the issue of the battle is still in doubt. The course of the fighting, however, has shown clearly that the era of facile Japanese successes is drawing to a close and that the Chinese Army is gradually developing into a formidable opponent.

AIR RAIDS

Chinese air forces invaded Japanese territory on 23rd February for the first time since the outbreak of war, when seven aircraft carried out a bombing raid on Formosa. Bombs were dropped on Taihoku, the capital, and on Chikuto. Forty persons are believed to have been killed and wounded at Taihoku, while heavy material damage was inflicted on both cities.

In retaliation, Japanese air forces have carried out extensive raids in China, penetrating as far inland as Chungking—the new Nationalist capital, in Szechwan. The heaviest air raid of the war took place on 17th March, when eighty Japanese airplanes raided the Chinese air port at Nanchang; numerous Chinese machines are claimed to have been destroyed. Ten days later, fifty Japanese aircraft raided Hankow, inflicting much damage on the city.

CORRESPONDENCE

[*Correspondence is invited on subjects which have been dealt with in the* JOURNAL, *or which are of general interest to the Services. Correspondents are requested to put their views as concisely as possible, but publication of letters will be dependent on the space available in each number of the* JOURNAL.—EDITOR.]

SPEED AND GUN POWER IN WARSHIPS

TO THE EDITOR OF THE R.U.S.I. JOURNAL.

SIR,—At the interesting Discussion on "Speed and Gun Power in Warships," the Chairman in his summing up referred to "optimum speed." He also quoted the "Queen Mary" as being the sort of ship that can be built to steam at 32 knots, and said that he did not think that any battleship could be given a speed in that region. But surely that expression means, given a ship of a certain size but carrying no useful load, there is still a limit to the amount of engine power which can be put into her, and that power will develop a certain speed—the "optimum speed." If so, it is not correct to quote the "Queen Mary" as an example of a ship with an optimum speed of 32 knots because, although she has no guns or armour, she carries stores, passengers, passengers' accommodation and requisites such as baggage, fresh water, salt water for baths, a very large number of boats, rafts, etc.; these, in all, amount to some 6,000 tons or more, and to a considerable extent offset the weight of guns and armour in a battleship.

It is usual to compare the size of warships by their "standard" displacement—a well-defined term meaning the total weight of the ship or of the water displaced when she is fully loaded, less oil fuel and reserve feed water. It is believed that the standard displacement of the "Queen Mary" is in the neighbourhood of 66,500 tons.

H.M.S. "Hood," on a standard displacement of 42,100 tons, is credited with having attained 32.07 knots on trials run in bad weather, and with a mean speed of 31.89 knots on a prolonged test. She carries eight 15-in. guns, a large and varied assortment of auxiliary and A.A. armaments, and she is well armoured. It is true that numerous alterations and additions, and the passage of years may have reduced her speed since 1920, when she was built; but, in the interval, both warship construction and the efficiency of propelling machinery have developed appreciably. A battleship on the general lines proposed by Captain Altham would not, therefore, appear to be beyond the wit of man to design and build.

OBSERVER.

DESTROYERS' BRIDGES

TO THE EDITOR OF THE R.U.S.I. JOURNAL.

SIR,—The demands for a covered-in bridge in destroyers have become most insistent of late. They are always met by the brief and doubtless reasonable rejoinder that the framework obstructs the all-round view which an officer taking

including some mechanized troops and supported by aircraft, recrossed the Grand Canal at two points and recaptured several villages on the Tientsin–Pukow railway. Some thousands of Japanese are reported to have been encircled, and the issue of the battle is still in doubt. The course of the fighting, however, has shown clearly that the era of facile Japanese successes is drawing to a close and that the Chinese Army is gradually developing into a formidable opponent.

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DESTROYERS' BRIDGES

TO THE EDITOR OF THE R.U.S.I. JOURNAL.

SIR,—The demands for a covered-in bridge in destroyers have become most insistent of late. They are always met by the brief and doubtless reasonable rejoinder that the framework obstructs the all-round view which an officer taking

compass bearings requires. Therefore, destroyer bridges remain open, and they may well continue to be so until some agreement can be reached. Why must there be these diametrically opposite views? There is surely no need for the two opposing camps to sit back and refuse to budge an inch. It is said that the English race has a genius for compromise, and clearly here is a case where compromise is necessary. Neither the open nor the closed bridge is entirely satisfactory, therefore we must try to devise something which combines the merits of both.

Let us consider, then, what we want to "cover" and protect. Lieutenant W. J. van de Kasteele, in your August, 1937 issue, gave indisputable reasons for wishing to shield the compass and its azimuth mirror from rain and spray. The chart table is already well screened, but in order that the chart shall remain dry we must also keep dry the officers who use it. Wet oilskins must not be allowed to rub and drip over the smooth surface of the chart. There must, in other words, be weather-proof sheltering for the compass and about three officers, so that the navigation may be properly done and that one may not be blinded from ahead.

All that is required is a glass front, and a roof extending only five or six feet back, sufficiently far to shelter the Pelorus. The further forward the compass, the less roofing is required. No other part of the bridge but the front need be covered, for the bridge personnel can stand well forward under it and gain protection from ahead. Rain from the beam or quarter is seldom severe, and does not disturb the eyes from looking out ahead. It is suggested, however, that a canvas flap be hung from the rear end of the roof for dropping as required, particularly against funnel gases which, when blowing on to the bridge for any length of time, very severely reduce the efficiency of the personnel.

The desirability of being able to shout down to "B" gun is admitted, and this could be achieved if one of the glass panes formed a sliding window. It is not suggested, however, that the whole structure should be collapsable and all the windows of the railway carriage type. I have served in several "S" and "T" class destroyers whose bridge structure can be opened up, and the extra struts, frames and woodwork consequent thereon are a distinct handicap when taking bearings. It is not recommended, either, that the roof should be made bullet-proof. The extra weight of the roof and increased girth of supports does not compensate for the few occasions on which an aircraft might attack a destroyer. Moreover, the roof could never attain to being bomb-proof. By being light and only extending over a portion of the bridge, the roof would not interfere with looking out for aircraft from anywhere abaft the compass platform, nor with the use of the wing gyro repeaters, nor with verbal communication from officer to searchlight-manipulator and look-out. To avoid increase of silhouette, and the hampering of the director's vision, the wheelhouse and its overhead space could be slightly lowered.

To conclude: British destroyers are, we believe, more sturdily built than some of the foreign types. We are not a "fair-weather Navy." It seems, therefore, that in war we might well look for success in a "foul-weather" engagement—provided we do not stand to be blinded on the bridge by rain and spray.

G. C. Trelawny,
Lieutenant, Royal Navy.

H.M.S. "Hyperion,"
2nd Destroyer Flotilla,
9th January, 1938.

ROAD OR RAIL TRANSPORTATION IN WAR?

To the Editor of the R.U.S.I. Journal.

Sir,—From time to time one comes across two phrases:—

"Not being able to see the wood for the trees," and "The tail wagging the dog." Both these terms might be applied to the "Second Prize Essay (Military), 1936," published in the November, 1937, issue of this Journal.

In this Essay, the author appears to be so obsessed with the advantages and attributes of the I.C. engined vehicles for all purposes, that he advocates the complete extinction in the theatre of war of all railway transportation and railway communications—thus obscuring "the wood for the trees," and in its place he suggests that I.C. engined vehicles should be operated in long distance convoys from base ports to fighting troops—thereby "the tail wagging the dog." To quote from the "Gold Medal Prize Essay" published in the August, 1937, issue of the Journal: "Bases in the future must always be located a very long way from the area of operations on account of the air danger."

With the speed and radius of action of modern bombing machines, it would be courting disaster to locate the base ports nearer than several hundred miles from the probable scene of active operations, and if one considers for one brief moment the effect of such a proposal on the transportation and subsistence problem, it will be readily realized that the elimination of all rail traffic in a theatre of war is impracticable, and—from an administrative aspect—its substitution by "long distance road transport convoys" from base to troops is both "ponderous" and "incongruous."

If, as is assumed by the author, the whole British Field Force is to be completely mechanized, and every vehicle is to be armoured, what will be the daily requirements in petrol—the life blood of the force. The number of I.C. engined vehicles required to transport the petrol, food, ammunition, ordnance, anti-gas and other stores between the base ports and the fighting troops—over a distance of several hundred miles ("70 miles a day at an average of, say, 15 miles per hour") would without doubt run into inordinate figures, and we would then come up against the problem of the "recurring camel"—referred to by the author of the Gold Medal Essay published in the August, 1937, issue of the Journal, "more lorries mean more petrol, more spare parts, more road store, and they again mean more lorries." How then are these long distance convoys running day and night between the base and the fighting troops to be protected from the air menace, since presumably they must be operated by day as well as by night if they are to reach their destinations in the forward area in the course of a week.

The accepted principle of supply is that there shall always at all times be two days supplies on wheels in front of railhead—that is either with field units or within easy reach of them—in addition to the emergency ration. Assuming that the fighting soldier, whether he be on his feet or in an armoured vehicle, requires to have his food delivered to him daily, then there must be a "continuous and never-interrupted flow from base to force." The author suggests that this so-called "vital umbilical cord" (*sic*) must be severed, that there must be no railheads, but instead a "forward mobile base" for each formation. He suggests that these "formation mobile bases" should carry no more than, say, a week's supply at the outside, together with stocks of "motivity" (*sic*) stores (petrol, lubricants and spare parts), and in "lesser proportion" as being of "lesser necessity" "ammunition, armament spares and rations," together with the percentage reinforcements of

fighting vehicles and personnel. " What an objective for the air forces of to-morrow —this organization " ! !

The *daily* requirements of the modern division are estimated at the following :—

Rations	30 tons.
R.E. Stores	10 ,,
R.A.O.C. Stores	10 ,,
Mails, N.A.A.F.I., A.M.F.O.	7 ,,
	57 ,,

To the above must be added the petrol and lubricants, and this, based on a daily mileage of 50 miles for every vehicle, is approximately 56 tons a day. This total some 113 tons exclusive of the daily expenditure of ammunition (gun, S.A.A. and explosives). But it must be remembered that the 30 tons of rations and 27 of other stores must be divided up for daily delivery purposes into one or more vehicles for each unit, depending on its strength and requirements—one cannot put the whole into, say, 19 3-ton lorries, since there are some 28 units in a division and some only require a 30-cwt. lorry or a 15-cwt. van load. It is estimated that this " forward mobile base " for each formation, say a division, carrying " no more than, say, a week's supply " of everything (petrol, ammunition, supplies, etc.) would represent a mass of some hundreds of vehicles—and this so-called mobile base is to be located in the forward area !

Now with regard to the subsistence of this force. The author suggests that the force, carrying all it needs, should subsist on the country where possible to supplement its " self-containment," and he advocates the " virtue of *frugality* " on active service. The Boer War saw the last of fighting troops subsisting for days and even weeks on end on bully beef and biscuits—but in the author's scheme of things—with forward mobile bases carrying a week's supply, the elimination of the use of all rail transportation, and foodstuffs coming up from the base all the way by road convoy (taking several days to reach these forward mobile bases), it follows automatically that the supply of frozen beef, fresh bread and groceries to the fighting troops is out of the question. Unfortunately such a retrograde step would not commend itself to the modern soldier, who, whatever his European nationality now demands proper and adequate daily nourishment to preserve both his morale and his physical fitness and energy. There were numerous instances during the later periods of the Great War, both amongst our Allies and in the German Navy, of the breakdown of morale and discipline, due primarily to the neglect of these essentials of well-being and welfare. The above are but a few of the " points " over which the Author in his Essay may be said to have " jumped the rails."

Finally, the author in his summing up appears to have come to the conclusion that the man—the fighting soldier—must be subordinated in every respect to the " I.C. engined vehicle with its mobility and its capacity for self-containment," in fact, that the vehicle will win the battle not the man, since in suggesting a clean sweep of the whole existing layout of administrative movement and its substitution by a long distance road convoy system, he eradicates in one sentence the *daily* replenishment to a fighting force of its requirements of fresh foodstuffs, petrol (its life blood), ammunition, and all other essentials necessary to maintain its fighting efficiency.

" PERA."

To the Editor of the R.U.S.I. Journal.

Sir,—"Pera," in his letter published in this issue of the Journal, attacks the views expressed in the Second Prize Essay (Military), 1936, so fundamentally that any reply can only rightly follow the same course. We will accordingly endeavour to meet his main criticisms. He states firstly, that the author appears to be so obsessed with the advantages of the I.C. engined vehicle that he would completely extinguish in the theatre of war all railway transportation; secondly, he denies the possible efficacy of a mobile base for the formation, coupled with long distance lorry transport in lieu of the railway; and lastly, insists that a high scale of feeding is necessary in what should presumably be mobile operations.

Our critic is surely not confusing mobile operations and static warfare? If it should unfortunately one day be the latter again, then mobility can be said to have flown the scene of hostilities; man-power, in its masses, to have come back into its own; and any value the I.C. engine might have in countering the air threat to be considerably reduced, if not negligible. For we would be back once again to the static conditions prevailing on the Western Front in 1914–18. And once we assume the use again of the horde army, then the only instrument of transportation able to cope with its heavy man-power and its colossal supply must remain the railway. If, however, it is on the maintenance of mobile forces that our critic takes us to task, that is an entirely different matter, and battle may be joined.

Forces to-day are inherently mobile, if built up on, and around, the I.C. engined vehicle; and this is particularly so, where the policy implemented is that of whole-hearted mechanization, as, for instance, exemplified in a Tank Brigade; while even the motorized formation, in which man-power has been considerably reduced, may be taken as coming within the same category. It is generally accepted that the salient features of mechanized operations will be their speed and dispersion; and that, irrespective of all other causes, the hostile aeroplane will make this so. So dispersion on the road and a maintenance traffic running loosely, as civilian traffic does, will be the method by which the enemy aircraft, if not actually deceived, will at least score least heavily. It is from this premise we must answer our critic.

He acknowledges that the hostile aeroplane has driven the main base to a great distance from the scene of battle. And if this is necessary for its working efficiency, must the same not apply equally so to an advanced base or railhead, which are fixed installations, and hence easily found and as easily attacked from the air? Will they not also have to be sited further to the rear and away from the enemy's operating aerodromes, for their safety and efficient working? Will maintenance, as in the past, still be effected from railhead? And if so, will it not perforce be by long distance lorry. We are back where we were. And how many transport echelons will be necessary in such an event? For even with our present 2nd and 3rd Line echelons of transport, 50 miles out represents the approximate daily maintenance distance from railhead which can be covered without undue strain. Again, air forces to-day are increasing so rapidly in numbers, speed, and power, that the use of the railway itself becomes increasingly problematical; and moreover, as man-power diminishes and with it its maintenance tonnages, so the necessity for the services of the railway must diminish also. Maintenance by long-distance road transport is certainly a reasonable possibility to-day. Already, in civil life, road transport has become a serious competitor to the railway. Mechanized forces, *per se*, connote a considerable reduction in man-power; and it is the man himself who in war is the most costly thing to maintain, and whose multifarious needs pile up the transported tonnages. Reduce his numbers, and tonnage drops surprisingly.

Petrol supply is unquestionably the first of all factors in sustaining mechanized mobility; and, as at present carried in can, demands a great many vehicles. But does its carriage in this way—a way which has almost been discarded in civil life—represent necessarily the only, and final, method of transportation? Must the large commercial lorry tanker, carrying this essence in bulk, not eventually be adopted, in order to economize in vehicles and personnel? Its use would assist in minimizing many a present difficulty—even that of the "recurring camel." The suggested mobile base, even if comprising two or three hundred vehicles, sited, say, 50 or 70 miles from the troops, does not really present a problem any greater than that occasioned when a mechanized force of several hundred vehicles has to lie up in "harbour." Its site in choice is not limited as that of a railhead; nor fixed, as that of the advanced base of the past.

A high standard of feeding and an ample scale of comforts undoubtedly go to preserve both morale and physical fitness. Unfortunately, however, one of the hard lessons of history is that mobility, the prized essence of the art of war, has invariably been the attribute of those armies which have gone frugally and hardily in their strategical highways and bye-ways, and so have not been shackled and hampered by the incubus of their supply.

Our critic finally reinforces criticism by a defence of existing ritual, thus: "The accepted principle of supply is that there shall always at all times be two days supplies on wheels in front of railhead," etc.—he would seem to claim for custom and procedure an inviolability which is unquestionable. But ritual, even though administrative and of long standing, has been made for man; and not man, for ritual.

G. C. SHAW,
Lieutenant-Colonel, R.A.O.C.

February, 1938.

GENERAL SERVICE NOTES

STATEMENT RELATING TO DEFENCE

On 2nd March, 1938, the Prime Minister presented a "Statement relating to Defence" to Parliament (White Paper Cmd. 5682, price 2d.). The following is a summary of the principal contents:—

PROGRESS

For reasons of public interest this survey must, for the most part, be expressed in general terms, and it is impossible to give specific details as to, for example, the output of any particular type of equipment.

The general lines on which it was proposed to expand capacity for the production of armaments was explained in the White Paper of February, 1937.[1] A number of new factories have been brought into production, and others are under construction. Existing factories are working to a high level of output. It is not to be expected that no set-backs should be encountered in a programme of this magnitude, which, moreover, includes the development of a number of articles of new design. For example, the full expansion of production necessary to enable the programme to be completed within the time originally contemplated has made demands on the supply of certain materials and on certain types of skilled labour which could not be met without some delay, the more so as it has been the policy to avoid as far as possible interference with the requirements of private industry. Regarding the task as a whole, it can be said that, while delays and difficulties have been experienced, and deliveries have not, in some cases, come up to anticipation, progress has on the whole been satisfactory. The difficulties hitherto encountered have been largely met and the rate of production is now rapidly increasing.

The supply position in regard to essential raw materials has been kept under continuous survey, and further action has been taken as found necessary in the course of the survey to provide for reserves in certain cases.

THE ROYAL NAVY

To turn to the Services individually, the speed with which the strength of the Royal Navy is being increased is shown by the following figures of tonnage building at successive dates:—

1st January, 1935	139,345
1st January, 1936	281,925
1st January, 1937	375,740
1st January, 1938	547,014

During the year April, 1938, to March, 1939, some sixty new vessels of all classes are expected to be put into service, representing a total of over 130,000 tons.

The programme of new ships to be laid down in 1938 has been planned in accordance with the principles stated in the preceding White Paper, and will consist

[1] For summary of this White Paper, see the JOURNAL for May, 1937, p. 407.

of: 2 capital ships; 1 aircraft carrier; 4 large cruisers; 3 small cruisers; 3 submarines; 3 minelayers; 2 river gunboats; 1 destroyer depot ship; 1 submarine depot ship; 1 Fleet Air Arm supply and repair ship. The programme will also include boom defence vessels, tugs, motor torpedo boats and miscellaneous small craft. Modernization of existing ships is continuing expeditiously. The work on one capital ship has been completed; three others are in hand for this purpose.

THE ARMY

As regards the Army, the accumulation of the necessary war reserves is proceeding on a large scale. In the production of nearly all the major articles of armament and equipment for which new designs are being adopted, the stages of design and development are already ended, or are within sight of completion. The present year should see warlike stores of modern pattern in growing use and, what is equally important, the potential means for maintaining and replacing such stores in time of war will be keeping pace with actual issues.

The Territorial Army

A certain amount of equipment, including vehicles, of modern pattern has already been issued to the Territorial Army, and it is expected that, later in the year, the situation will allow of these issues being substantially increased. As an interim measure, arrangements have been made for the loan of weapons and transport from Regular Army sources for use during the forthcoming camping season. The scale of vehicles for Territorial Army Units this summer will be largely increased.

THE ROYAL AIR FORCE

The new types of aircraft were for the most part placed in production before the construction and testing of prototypes. This policy, which was deliberately adopted in order to reduce delay to a minimum, has involved certain initial difficulties, but it has enabled new types of aircraft to be delivered to squadrons much earlier than would have been possible under the methods used in the past. The types in question have shown a high degree of performance. The equipment, including many new and improved types of armament and instruments, has come fully up to expectations, and deliveries are now proceeding satisfactorily. As a further step to ensure maximum production, the number of types of aircraft in the Service is being progressively reduced, so that not only can a clear run be obtained in each factory on a single type, but it is also possible to arrange for several factories to be engaged in the production of one type.

Manufacturing capacity has been substantially developed to provide a sufficient supply of aircraft, engines and equipment. The six shadow factories for the manufacture of engines have already begun production. One of the two airframe shadow factories is expected to begin production a few weeks hence, and the other later in the year. Other shadow factories for airscrews and carburettors have also started production, and a shadow factory for bombs is on the point of doing so; these factories are additions to the programme as at first conceived, and are examples of the enlargements which the working-out of the programme entails.

WORKS SERVICES

Concurrently with industrial requirements for armament production, the defence programme involves a large number of works services, many of them of considerable magnitude. An instance is the additional storage accommodation,

entailing heavy expenditure, for the accumulating reserves of all kinds of the three Services.

Good progress has been made with the Army works services for bringing barrack accommodation up to modern standards, and providing the workshops and buildings required for modern mechanized forces, both at home and abroad. A large building programme is also being carried out to provide the new type of accommodation which is necessary for the units and equipment of the two Anti-Aircraft Divisions; the majority of such units have now been provided with accommodation, either permanent or temporary.

The total number of new aerodrome sites acquired since the expansion programme started is 59, of which 30 are now occupied by units.

PERSONNEL

Naval

To keep pace with the growing strength of the Fleet, naval personnel has expanded at a steadily increasing rate. Additions were made to total numbers of approximately 3,000 during the years 1933 and 1934, and of approximately a further 10,000 during the years 1935 and 1936. In the year 1937 an increase of over 10,000 has been planned, the effect over the five years being an expansion of about 25 per cent. In 1938 an increase of 7,000 is in contemplation.[1]

There is every reason for confidence that the higher level of entries will be maintained. Actually, during the first three quarters of the year 1937, over 11,000 recruits have been entered for the Navy. Some difficulty has been experienced in the past year in obtaining skilled tradesmen, owing to the demands of the re-armament programme, but the position in this respect is showing most satisfactory improvement.

The rapid rate of expansion of naval personnel has taxed to the utmost the organization for recruiting, training and drafting. At many naval training establishments building has been undertaken to accommodate the larger numbers receiving instruction. H.M.S. "Caledonia" (late s.s. "Majestic"), the new boys' training establishment at Rosyth, has proved invaluable, and her location has been followed by an increased entry of boys from Scotland.

Army

A number of measures have been taken to facilitate and encourage Army recruiting. These measures fall under two headings: revision of the qualifications for enlistment and improvements in conditions of service. Under the first heading, physical and educational standards have been adjusted to suit the duties of the various arms, and in certain Corps the age limit has been raised. Under the second heading there have been increases of ration allowance and of recruits' kit allowance, the improvement of messing and accommodation, the abolition of "holding" for an extra year's service abroad and the granting of permission to soldiers over 21 years of age to sleep out of barracks. During 1937, 3,600 more recruits were taken than in the previous year.

Last August men serving in sections A and B of the Army Reserve were invited to rejoin the Colours; up to the end of January some 2,600 had done so

The year 1937 was a record recruiting year for the Territorial Army, 45,320 recruits being obtained and the strength of all ranks being increased by 17,690.

[1] The figures are for financial years.

Air Force

In the Air Force, training facilities have been greatly extended both for pilots and technical personnel, and further extensions will be made. The number of Service flying training schools has been increased from four to eleven, and they have also been relieved entirely of elementary flying training, which is now carried out at thirteen civil flying schools. The number of armament training camps has already been increased from three to seven, and others are to be opened later.

Notwithstanding the increase of the numbers under training, experience shows that the new pilots are entering the service squadrons from the flying training schools with a higher standard of flying efficiency than formerly. Since April, 1935, approximately 4,500 candidates have been accepted for training as pilots, and 40,000 airmen (including 6,300 apprentices) mostly for training in skilled trades, as compared with a typical pre-expansion entry of approximately 300 pilots and 1,600 airmen a year.

The Royal Air Force Volunteer Reserve, which was recently established to create a reserve of pilots and other personnel, is working very satisfactorily and will be further extended. The estimated pilot entry for the year April, 1937, to March, 1938, was 800, but this programme has already been exceeded, and over 1,000 entrants for the pilot reserve have been accepted since April, 1937. The number of centres so far opened is 21, and 12 more will be opened in 1938.

NEW FORMATIONS

Fleet Air Arm

Detailed plans are being worked out by the Admiralty and Air Ministry to give effect to the decision taken in July, 1937, for the transfer to the Admiralty of the administrative control of the Fleet Air Arm.[1] The Air Ministry will be responsible for the training of pilots up to the point when their specialized training begins, after which the Admiralty will assume full responsibility.

Army

Of the four new infantry battalions and two new Army tank battalions referred to in the White Paper of February, 1937, two infantry battalions and one tank battalion have been formed, and very satisfactory progress made in building them up to establishment. It is hoped to raise the other tank battalion shortly. The Mobile Division is now in being as a formation, and will train as such this year. Arrangements have been made with the Government of India which will make it possible to continue the mechanization of cavalry regiments.

Certain of our overseas garrisons have been strengthened, and further increases are in contemplation; steady progress has been made in improving the defences of our overseas bases.

Air Force

In the process of building up an adequate home defence Air Force, the metropolitan strength was raised during the past year to 123 squadrons; the corresponding number in 1934 was 52 squadrons. The present force comprises 68 bomber squadrons, 30 fighter squadrons, 15 squadrons of general reconnaissance aircraft and torpedo bombers, and 10 Army Co-operation squadrons. The necessary organization is being developed to enable the Force to operate with the maximum efficiency.

[1] See Journal for August, 1937, p. 633.

Further stages of expansion will take the form of increasing progressively the strength of the Royal Air Force both by forming additional squadrons and by increasing the establishments of individual squadrons.

ANTI-AIRCRAFT DEFENCE

The development of active ground defence against air attack has continued throughout the year. More units have been converted to form part of the expanded second Anti-Aircraft Division, and others have been converted and reorganized for Coast Defence purposes. Between April and December, 1937, the two Anti-Aircraft Divisions increased their strength by 345 officers and over 9,000 other ranks. The new types of weapons and equipment to which reference was made in last year's White Paper will shortly be issued. Special attention is being given to the protection of vulnerable points.

A successful start has been made with the balloon barrage scheme, most of the material for which has already been delivered. Sufficient regular personnel have been fully trained to enable them to supervise and train in their turn the auxiliary personnel who will be primarily responsible for manning the barrage. Recruiting of the auxiliary personnel, which awaits the completion of the necessary stations, is expected to start in May.

As regards the system of organization, the Air Ministry is responsible for the air defence scheme as a whole and the anti-aircraft units of the Territorial Army, which provide the gun and searchlight defences, come directly under the Air Officer Commander-in-Chief, Fighter Command, for operations in war and combined training in peace. Plans are prepared in a joint Committee, the membership of which includes the Anti-Aircraft Divisional Commanders and representatives of the operations branches of the War Office and Air Ministry, the Air Officer Commander-in-Chief, Fighter Command, being Chairman. The latter has on his staff two General Staff officers from the Army. The Anti-Aircraft Divisional Commanders have their Headquarters with the Commanders of the Fighter Groups in peace. In all operational matters there is direct communication between Headquarters, Fighter Command, and the Anti-Aircraft Divisions.

AIR RAID PRECAUTIONS

The measures for the protection of the civilian population against the consequences of air raids have been taken an important stage forward by the Air Raid Precautions Act, 1937, under which Local Authorities will discharge the duty of preparing comprehensive schemes for the purpose, with substantial financial assistance from the Exchequer in respect of approved schemes. The underlying principle is that while the schemes will be prepared under general guidance from the Home Office or Scottish Office, and in respect of some parts of them under central direction, they will be framed for the requirements of each Local Authority area, thus ensuring the action best adapted to the needs of the locality, and the flexibility without which the scheme might break down in emergency.

A general training school for Air Raid Precaution Officers of Local Authorities is being opened in London. About 25 to 30 officers will attend each course, which will last between two and three weeks. The two schools for anti-gas measures are now fully in operation, and a course for superintending instructors in the measures for dealing with incendiary bombs is also beginning. In addition local schools or courses of instruction for air raid wardens and for first-aid parties are being set up by Local Authorities in steadily increasing numbers.

A large proportion of the gas respirators required to supply the whole civilian

population is already available, and the balance will have been obtained by the end of this year; these will be stored in a number of central stores, and quantities of them will be released for storage by Local Authorities as soon as the Authorities have made their arrangements for storage. The supply of protective clothing proceeds regularly, and arrangements are being made for its partial distribution to Local Authorities.

Advice has been given to industrial and commercial undertakings as to the measures which they can and should take to give reasonable protection to the persons employed in them. Discussions are proceeding with public utility undertakings as to the steps which can be taken for the maintenance of essential public services of power, light, water, etc.

(The Paper then details the arrangements being made for emergency fire precautions, and for organizing special transport services. Reference is made to schemes "to enable sea-borne traffic to be diverted as required to alternative ports"; also to the control and distribution of food; the maintenance of oil supplies and alternative methods of propulsion.)

EXPENDITURE

In the White Paper of February, 1937, it was stated that it was not possible to determine what would be the peak year of defence expenditure: that must depend on circumstances which could not then be foreseen, and upon decisions to be taken in future years. Taking the programme as it then stood, however, it was stated that it would be imprudent to contemplate a total expenditure on defence during the next five years of much less than £1,500 millions.

Estimates for the current financial year provided for a total expenditure by the three Defence Departments (including Royal Ordnance Factories) of £278¼ millions, of which £80 millions was to be met by issues from the Consolidated Fund under the Defence Loans Act, 1937. In addition, about £5¼ millions was provided for air raid precautions schemes.

For the ensuing year, 1938, provision is made in the Estimates of the three Defence Departments (including Royal Ordnance Factories) for expenditure amounting to £343¼ millions, of which it is proposed to meet £90 millions by issues from the Consolidated Fund under the Defence Loans Act. In addition, nearly £8.5 millions is provided for air raid precautions services.

Present indications are that the defence programmes now in hand are likely to involve defence expenditure in 1939 in excess of the provision made in the Estimates for 1938.

The course of expenditure in subsequent years is necessarily dependent upon circumstances which cannot at present be foreseen, and in particular upon the degree of success which attends the efforts of His Majesty's Government to achieve some appeasement in international affairs.

The continuous development of modern armaments has given rise in the past twelve months to a number of new needs; and the growing power and complexity of new weapons tends to increase their cost. The flexibility of the whole programme has made it possible to meet by reductions in other directions some part of the increased cost arising from these tendencies, but under present international conditions they must continue to operate, and to enlarge the total of expenditure. It must therefore be expected that even on the assumption that 1939, as now seems probable, will be the peak year of defence expenditure, the total expenditure on defence over the five financial years 1937–41 will exceed the sum of £1,500 millions mentioned in the White Paper of February, 1937.

NAVY NOTES

GREAT BRITAIN

INSPECTION BY H.M. THE KING

It is officially announced that the King will inspect the Home Fleet on Tuesday, 21st June, and Wednesday, 22nd June. This will be his first visit to the Fleet since the Coronation Naval Review.

THE NAVY ESTIMATES

The Navy Estimates for the financial year 1938–39 were presented to Parliament on 4th March. The net total is £123,707,000, which is £18,642,000 more than the total of the 1937 Navy Estimates. Towards this amount, £30,000,000 will be provided from the Consolidated Fund under the provisions of the Defence Loans Act, compared with £27,000,000 in 1937. The net total of Navy Estimates, 1938, is therefore £93,707,000, compared with £78,065,000 in 1937, an increase of £15,642,000.

The Estimates contained no provision for a new construction programme for 1938, as details had not been completed. A Supplementary Estimate will be presented later for so much of the work on that programme as will fall to be done during the financial year. Details of the programme were published in a "Statement Relating to Defence" (Cmd. 5682) published on 2nd March, as follows:—

2 Capital ships.
1 Aircraft carrier.
4 Large cruisers.
3 Small cruisers.
3 Submarines.
3 Minelayers.
2 River gunboats.
1 Destroyer depot-ship.
1 Submarine depot-ship.
1 Fleet Air Arm supply and repair ship.
A number of Boom defence vessels, tugs, motor torpedo-boats and miscellaneous small craft.

The figures for new construction, that is, expenditure on vessels of the 1937 and earlier programmes, show an increase over 1937 of £7,895,375. This is indicative, states the First Lord, of the good progress which is being made in the large building programmes of 1936 and 1937. Another large increase is to be found in the provision for maintenance, repair and manning of the Fleet, which is £9,120,925 larger than the provision for these services in 1937. Contributory factors are a much bigger volume of dockyard work on large repairs, including the modernization of capital ships, and a rise in the prices of materials.

An increase of £1,398,000 in the provision for the Fleet Air Arm, excluding the cost of aircraft for new construction, is due partly to the maintenance of a larger first-line strength and the provision of reserves, and partly to the transfer to Navy votes from Air votes of certain services, arising out of the decision of the Govern-

ment last year to transfer the administration of the Fleet Air Arm to the control of the Admiralty.

Vote A (numbers) provides for 119,000 officers and men, an increase of 7,000 over the 1937 total, 6,308 in the Royal Navy and 692 in the Royal Marines. In the Statement Relating to Defence, confidence is expressed that the higher level of entries will be maintained; actually, during the first three quarters of the year 1937, over 11,000 recruits were entered for the Navy.

The vote for works, docks and buildings amounts to £5,468,000, compared to £5,194,700 in 1937; the expenditure under this vote in 1936 was £3,092,290, and in 1935, £2,050,026.

Statement in Parliament.

In the absence of Mr. Duff Cooper owing to illness, the Estimates were presented in the House of Commons on 17th March by Mr. Geoffrey Shakespeare, Parliamentary Secretary. Following are points from his speech:—

The expenditure on new construction, apart from vessels to be ordered in 1938, was £41,500,000. The amount included in the 1914 Estimates for new construction was about £18,000,000. Thus even allowing for increase in cost, we were making a greater effort now than in 1914.

By March, 1939, delivery was expected of one aircraft-carrier, five 10,000-ton cruisers, three flotillas of destroyers of eight each, twelve submarines, and two submarine depot-ships.

The reason why no destroyers were included in the new 1938 programme was that, when the Admiralty had placed an order for the last flotilla of eight in completion of the 1937 programme, they would have no fewer than forty destroyers on the stocks.

An important naval event during the year was the opening of the King George VI dock at the Singapore base. This new dock was large enough to accommodate a vessel of the size of the "Queen Mary" and was adequate for all our anticipated requirements.

Of the new branches set up to deal with air material and air personnel, the latter was a temporary expedient during the early stages. Later the personnel of the Fleet Air Arm would be administered together with other branches. There was no intention to set up a kind of miniature Air Ministry within the Admiralty.

Arrangements were being made for a very close liaison with the Air Ministry as a permanent measure, and it was proposed to increase the number of naval personnel at present serving in the Ministry.

It is intended to fit all capital ships and larger cruisers with aircraft operated from catapults.

The personnel asked for was the highest since 1922. The number of men enlisted in the course of the current year constituted a record for peace time.

No new facts have emerged which would justify the Admiralty in departing from their existing policy not to return to coal or dual firing.

As regards convoy, to deal with attack in narrow waters from aircraft or submarines, escort ships must be of moderate speed, equipped with strong anti-aircraft armament and able to detect, hunt and kill submarines. These characteristics are being combined in a type of escort vessel of which we now have a number, and of which the earlier ones are being re-armed for this purpose. Older destroyers are also being converted for escort purposes, and there will be a steady programme of conversion to A/A vessels of the old cruisers of the "C" and "D" classes.

The Admiralty recognize that convoy may be necessary as early as the outbreak of war, and they are ready to put it into operation, where and when required. Reserves of armaments, stores and material necessary to ensure the protection of the Merchant Navy are being built up.

Grant of Marriage Allowance

The Parliamentary Secretary proceeded to describe the new scheme of marriage allowance for officers. In future, marriage allowance will be payable to the married officer at the age of 30, and will be applicable to all officers up to the rank of Captain in the Navy or Lieutenant-Colonel in the Royal Marines.

A reduction of 2s. a day is to be made in the full pay of all those ranks, with the exception of the few Lieutenants concerned. Reduction will only take place on next promotion, or in respect of officers now married or who might marry before their next promotion, if they opted before promotion to enjoy the benefit of the new marriage allowance.

Marriage allowance for a Captain, R.N., will be 5s. 6d. a day, and for other Commissioned Officers, 4s. 6d. Allowances for children will be the same in all cases; 2s. a day for the first child and 1s. a day for subsequent children. A married officer, a Captain, with one child will receive extra remuneration of £100 a year, or, if he is below the rank of Captain, of £80 a year, that is in marriage allowance after the cut of 2s. a day had operated.

When the officer is on shore at home and not provided with quarters, the marriage allowance takes the place of the lodging allowance hitherto paid, and is, roughly, equivalent to it. When he is afloat he receives the extra £80 or £100 towards the support and maintenance of his family.

Warrant officers from the age of 25, and Commissioned Officers promoted from Warrant rank, will also receive a marriage allowance. It is felt that the automatic system of promotion among Warrant Officers discouraged zeal, and it will be replaced by a system of promotion by selection. The promotion of Lieutenants from Warrant rank will be increased. It has been decided to double the number of appointments as Paymaster Lieutenant open to Commissioned Officers promoted from Warrant rank in the Writer and Supply Branches. Further benefits to Warrant Officers include an increase in uniform allowance from £50 to £70, and of the compensatory allowance for officers obliged to mess in a Ward Room from 1s. 6d. to 1s. 10d. a day.

Flag Appointments

East Indies.—The King has approved the appointment of Vice-Admiral James F. Somerville, C.B., D.S.O., to be Commander-in-Chief, East Indies, to date 17th June, 1938, in succession to Vice-Admiral the Hon. Sir Alexander R. M. Ramsay, K.C.B., K.C.V.O., D.S.O., and to assume command about 7th August.

Home Fleet.—Admiral Sir Charles M. Forbes, K.C.B., D.S.O., assumed command of the Home Fleet on 12th April, at Portsmouth, in succession to Admiral Sir Roger Backhouse, G.C.V.O., K.C.B., C.M.G.

China Station.—Vice-Admiral Sir Percy L. H. Noble, K.C.B., C.V.O., assumed command of the China Station at Hong Kong on 5th February, hoisting his flag in H.M.S. "Cumberland." The flag of Vice-Admiral L. G. E. Crabbe, C.B., C.I.E., D.S.O., was struck in H.M.S. "Falmouth" the same day.

MEDITERRANEAN FLOTILLAS.—The appointment of Rear-Admiral John C. Tovey, C.B., D.S.O., as Rear-Admiral (D) Commanding Destroyer Flotillas, Mediterranean Fleet, in succession to Vice-Admiral James F. Somerville, C.B., D.S.O., was dated 5th March. He assumed command on 4th April.

AFRICA STATION.—Rear-Admiral G. H. D'Oyly-Lyon, C.B., succeeded Vice-Admiral Sir Francis L. Tottenham, K.C.B., C.B.E., as Commander-in-Chief, Africa Station, on 8th March.

FIRST BATTLE SQUADRON.—The appointment has been approved of Rear-Admiral Ralph Leatham, C.B., to be Rear-Admiral, First Battle Squadron, in succession to Vice-Admiral T. H. Binney, C.B., D.S.O., to date July, 1938.

CHIEF OF STAFF, MEDITERRANEAN.—The appointment has been approved of Rear-Admiral Bruce A. Fraser, O.B.E., to be Chief of Staff, Mediterranean Fleet, to Admiral Sir Dudley Pound, to date about 1st May, 1938.

DIRECTOR OF PERSONAL SERVICES.—Rear-Admiral H. D. Pridham-Wippell, C.V.O., has been appointed Director of Personal Services, in succession to Rear-Admiral Geoffrey Layton, C.B., D.S.O., to date 9th May, 1938.

COMBINED EXERCISES

Combined exercises between the Home and Mediterranean Fleets were held to the westward of Gibraltar in March, when over seventy vessels took part, under the command of Admirals Sir Roger Backhouse and Sir Dudley Pound.

Part I of the exercises, from 7th to 11th March, consisted of a series of seven tactical exercises, both by day and night. The composition of the forces on either side was varied for each exercise.

After spending the week-end at Gibraltar, the Fleets put to sea again on 14th March for Part II of the exercises, which took place West of Gibraltar and South of 36° N. (the Latitude of Tarifa). As in Part I these exercises were of a tactical nature, except one which took place on Wednesday, 16th March. In this latter, the Red Fleet, composed of five battleships, one aircraft carrier, seven cruisers and four destroyer flotillas, was opposed to the Blue Fleet, consisting of two battle-cruisers, four cruisers, one aircraft carrier, one destroyer and seven submarines. The general idea was as follows :—

" Red land is imagined to exist to the West of a line joining Fora Island (Madeira) and the North-East point of Teneriffe, and to the South of a line drawn due West from the West point of Madeira. The coasts of Spain and Morocco are neutral. Blue land is the Azores. Imaginary neutral land exists North of latitude 36° N. and East of longitude 13° W. Red has forces based on Madeira and Teneriffe and receives reports that a strong Blue raiding force has evaded the Red Patrols and is operating against Red shipping in the western approaches to the Straits of Gibraltar. Red's object is to locate and destroy Blue."

Admiral of the Fleet Lord Chatfield, First Sea Lord, witnessed the exercises as the guest of Admiral Backhouse in H.M.S. " Nelson." He arrived at Gibraltar on 12th March in H.M.S. " Cornwall " from Marseilles, where he had conferred with Vice-Admiral Darlan, Chief of the French Naval Staff.

CRUISES AND EVENTS

VISITS TO PORTUGAL.—The " Nelson," " Rodney," flotilla leader " Exmouth " and destroyers " Electra," " Escort," " Express " and " Esk " visited Lisbon from 1st to 4th February under the command of Admiral Sir Roger Backhouse. This

was the first visit of a British squadron since 1931, and the officers and men received a cordial welcome.

The depot-ship "Lucia" and submarines "Seahorse" and "Starfish" visited Lisbon from 26th February to 4th March. Portuguese officers cruised in the British submarines, and British officers were taken for trips in Portuguese submarines.

RESCUE IN CHINA.—When the French steamer "Yolande" went ashore early on the morning of 5th March on the Shantung Promontory and began to break up, her crew were rescued by H.M.S. "Capetown," Captain C. Coppinger, D.S.C. A salvage party was landed, but at first, efforts to pass lines to the ship failed. Another party which proceeded four miles from the landing place to the wreck succeeded in bringing all the survivors ashore by an improvised breeches buoy; they included six Europeans, including the captain and his daughter, and fifty-four Chinese.

RESCUES FROM THE "BALEARES."—When the Spanish insurgent cruiser "Baleares" was sunk by torpedo attack from destroyers on 6th March, about four hundred of her crew were rescued by the "Kempenfelt" and "Boreas." Nearly five hours later, when the survivors were being transferred to the Spanish cruiser "Canarias," the latter was attacked by aircraft, and Able Seaman George Long, of the "Boreas," was killed by a bomb splinter. Two other British seamen were injured.

BARCELONA EVACUATIONS.—H.M.S. "Penelope" arrived at Barcelona on 23rd March to evacuate British subjects owing to the intensive air bombardments of the city. H.M.S. "Arethusa" had previously evacuated certain British subjects to Marseilles.

OPENING OF SINGAPORE BASE

The Naval Base at Singapore was formally opened on 14th February by the Governor of the Straits Settlements, Sir Shenton Thomas, whose yacht, the "Seabelle," entered the new King George VI Dock escorted by the destroyers "Duncan" and "Diamond." Three United States cruisers, the "Trenton," "Milwaukee" and "Memphis," under the command of Admiral Townsend, were present at the ceremony, and 4,000 officers and men from the British and American ships took part. Lieut.-Colonel J. J. Llewellin, M.P., Civil Lord of the Admiralty, read a message from the Board expressing appreciation to all who had helped to build so strong and complete a base in such a short time. A large number of official guests, who included six Sultans of Malaya, were received on board the aircraft-carrier "Eagle."

COMBINED EXERCISES AT SINGAPORE

A combined operations exercise was held at Singapore from 2nd to 5th February, in which the following forces took part:—

ROYAL NAVY.—Vice-Admiral the Hon. Sir Alexander Ramsay in command, with the cruisers "Norfolk" and "Emerald" (East Indies Squadron); the "Indus," "Hindustan" and "Investigator" (Royal Indian Navy); and from the China Squadron the cruiser "Dorsetshire," aircraft-carrier "Eagle," depot-ship "Medway," and eleven submarines with their attached destroyer "Westcott," flotilla leader "Duncan" and four destroyers of the 8th Flotilla.

ARMY.—Major-General W. G. S. Dobbie, G.O.C., Malaya, with units of Royal Artillery, Royal Engineers, and Royal Corps of Signals; the 1st Battalion, The Inniskilling Fusiliers, and the 2nd Battalion, The Gordon Highlanders; the 1st/2nd Punjab Regiment from Taiping and the Malay Regiment.

ROYAL AIR FORCE.—Air Vice-Marshal A. W. Tedder, A.O.C., Far East Command, with Nos. 36 and 100 (Torpedo Bomber) Squadrons, Nos. 205, 230 and 203 (General Reconnaissance) Squadrons, and Nos. 84, 39 and 60 (Bomber) Squadrons, with their attendant bomber-transport aircraft and the Straits Settlements Volunteer Air Force.

PERSONNEL

OFFICERS' TROPICAL DRESS.—The King has approved the introduction of a tropical dress for officers. It will include white shirt, shoulder straps, white shorts, white stockings and white shoes, or blue stockings and black shoes or lace-up boots; and for landing parties, lace-up boots, white cap (or cap with white cover) or helmet, as ordered. The dress is to be worn on tropical stations on non-ceremonial occasions, at the discretion of the Senior Naval Officer.

SUPPLEMENTARY OFFICERS FROM R.N.R.—Further transfers of Executive officers of the R.N.R. to the Supplementary List of the R.N. will be made during 1938, but further transfers of Accountant officers are not at present contemplated. An addition has been made to the conditions of service of officers on the Supplementary List to provide that in the event of any officer being specially recommended to specialize in gunnery, torpedo, navigation or signals, the case will be considered on its merits.

SUPPLEMENTARY LIST ABOLISHED.—On 30th March, the Admiralty announced that officers transferred from the R.N.R. to the R.N. will not in future be borne on a Supplementary List, but their names will appear in the general list of the Navy. These officers will, therefore, be eligible to be considered for promotion on their merits under the usual regulations governing such promotion. They will also be eligible for marriage and children's allowances on the same scales and subject to the same conditions as other officers.

NAVAL HISTORY PRIZES.—The following awards have been made on the result of the annual prize competition in Naval History for the year 1937: Lieutenant R. J. Hemingway, H.M.S. "Regent," first prize of £50, medal, and certificate of merit; Lieutenant R. F. Kipling, H.M.S. "Herald," second prize of £30 and certificate of merit; Lieutenant P. W. Gretton, D.S.C., R.N. College, Dartmouth, third prize of £20 and certificate of merit; Lieutenants V. A. Wight-Boycott, H.M.S. "Delight," M. Keith-Roach, H.M.S. "Orpheus," and M. G. Haworth, H.M.S. "Danae," prizes of £10 and certificates of merit; Lieutenant S. L. C. Maydon, late of H.M.S. "Orpheus," certificate of merit.

HISTORY EXAMINATION, 1938.—The subject-matter of the essay for the annual examination in Naval History for 1938 will be the conditions of service and life afloat in the latter half of the XVIIIth Century (*circa* 1740–1805). A list of the books recommended was published in A.F.O. 466, dated 3rd March, 1938.

GOODENOUGH PRIZE.—The Goodenough Memorial Prize for 1937, for the officer who when qualifying for Lieutenant passes the best examination of his year in gunnery, provided he has also taken a first-class certificate in seamanship, has been awarded to Sub-Lieutenant F. D. Holford, R.N., H.M.S. "Wolverine."

RE-ENGAGEMENTS.—Official figures published on 11th March showed that of the 3,315 men whose first period of twelve years service in the Navy expired during the year ending 31st March, 1937, 2,295 or just over 69 per cent., re-engaged for the further ten years service to complete time for pension. This figure would have been much higher were it not that the proximity of Chatham to London leads to many married seamen and stokers seeking civil employment after their first twelve

years, many afterwards discovering that they would have done better to re-engage. During the year, only 47 per cent. of seamen and 49 per cent. of stokers in the Chatham Division re-engaged. For Portsmouth, the figures were 74 per cent. and 77 per cent. respectively, and for Devonport, 58 per cent. and 77 per cent.

INCREASED MARRIAGE ALLOWANCE.—In the House of Commons on 11th March, the Parliamentary Secretary to the Admiralty said that it had been decided to increase the basic rate of marriage allowances of naval ratings and other ranks in the Royal Marines to 17s. a week. The former rate was 7s. for men on the 1919 scale of pay, and 10s. on the 1925 scale.

The Secretary added that as regards ratings on the special service rates of pay, able seamen, leading seamen, signalmen, leading signalmen, telegraphists and leading telegraphists would in future receive an extra 6d. a day.

The grant of marriage allowances to officers is referred to under "The Navy Estimates."

MATERIAL

1937 PROGRAMME.—The first of the five cruisers of the "Fiji" class to be laid down was H.M.S. "Nigeria," by Vickers Armstrongs, Limited, at their Walker-on-Tyne yard, on 8th February.

The small minelayer "Redstart," for service as a tender to the "Vernon," was launched by Messrs. Henry Robb, Ltd., Leith, on 14th April.

It has been decided that "Guillemot" is to be the class name for the three patrol vessels of the 1937 programme which are to be built to a modified design of the "Kingfisher" class, and orders for which are to be placed shortly.

1936 PROGRAMME.—The cruiser "Belfast" was launched by Messrs, Harland and Wolff, Ltd., Belfast, on 17th March. A sister ship, the "Edinburgh," was launched by Messrs. Swan Hunter and Wigham Richardson, Ltd., Wallsend-on-Tyne, on 31st March.

The minesweeper "Gossamer" was completed on 31st March by Messrs. Wm. Hamilton and Co., Ltd., Port Glasgow.

The small minelayer "Linnet," for service as a tender to the "Vernon," was launched by the Ardrossan Dockyard, Ltd., on 24th February.

Motor torpedo-boat No. 102 was commissioned towards the end of March as tender to the "Vernon." This is the first M.T.B. built for the Navy by Messrs. Vosper, Ltd., Portsmouth.

1935 PROGRAMME.—The cruisers "Manchester" and "Liverpool," due for completion shortly, will relieve the "Enterprise" and "Emerald" on the East Indies Station.

The submarine "Sterlet," last of the "Swordfish" class, was due to be completed at Chatham Dockyard in April, for service in the 5th Submarine Flotilla at home.

The escort vessel "Bittern" was completed by Messrs. J. S. White and Co., Ltd., Cowes, on 15th March, and proceeded to Portsmouth to prepare for service in the 1st Anti-Submarine Flotilla, Portland.

The minesweeper "Gleaner," fitted for surveying duties, was completed in April by Messrs. W. Gray and Co., Ltd., West Hartlepool, for service in place of the "Beaufort."

The submarine depot-ship "Maidstone," built by Messrs. John Brown and Co., Ltd., Clydebank, began her trials in March and was due to complete in May to relieve the "Cyclops" as depot-ship of the 1st Submarine Flotilla in the Mediterranean.

Miscellaneous

Commissions from the Ranks.—Replying to a question in Parliament on 16th March, the Civil Lord of the Admiralty states that 16 per cent. of the serving Commissioned Officers in the Royal Navy have risen from the ranks.

Rifle Meetings.—The annual meetings of the R.N. and R.M. Rifle Associations will be held at Bisley from 27th June to 2nd July immediately before the Bisley N.R.A. meeting.

Stranding of the "Walrus."—The destroyer "Walrus" was driven ashore near Scarborough on 12th February in a gale while being towed from Rosyth to Portsmouth. The four ship-keepers on board got ashore on a float and were taken to hospital suffering from shock and exposure. The damage to the vessel was found so extensive that it was decided not to salve her, but to dismantle her and dispose of the hull.

Gifts to the "Birmingham."—On 31st January, the cruiser "Birmingham," before leaving Portsmouth for China, received gifts from the city after which she is named. A party of 400, including the Lord Mayor, travelled from Birmingham. The gifts included ceremonial drums and bugles and a cheque for £64 to buy a radio gramophone, from the Mayor and Corporation; a silver cup from the Birmingham Assay Office; a silver salver from the Birmingham Jewellers' and Silversmiths' Association; silver tankards from the Birmingham Territorial units; and a White Ensign from the Birmingham branch of the Navy League. In addition, Lieutenant-Colonel A. J. Round made a personal presentation of a cup salved from the German cruiser "Emden"; and a sports cup was presented by the Birmingham Football Club.

THE FLEET AIR ARM

New Departments.—Captain M. W. S. Boucher, D.S.O., has been appointed to the new post of Director of Air Material, and Captain H. H. McWilliam to that of Director of Air Personnel. These appointments have been created to give effect to the Government decision of July last to transfer the administrative control of the Fleet Air Arm from the Air Ministry to the Admiralty. Commanders J. H. I. Wood, J. B. Heath, C. John and R. S. D. Armour have been appointed to the Department of Air Material, and Commanders M. Slattery, C. B. Tidd and J. P. Wright to that of Air Personnel.

Responsibility for Training.—It was announced in the White Paper on Defence issued on 2nd March that the Air Ministry will be responsible for the training of pilots up to the point when their specialized training begins, after which the Admiralty will assume full responsibility.

Transfer of Aerodromes.—The special Fleet Air Arm training under the Admiralty will occupy six months, and will include advanced navigation, deck landing and catapulting. This period will probably be spent at the training bases at Ford, Gosport, and Lee-on-the-Solent, which are expected to be transferred to Admiralty control, and will conclude with a cruise in the training aircraft-carrier "Furious." The training period finished, officers will be sent to seagoing units for full flying duties.

SHORT-SERVICE COMMISSIONS.—The Admiralty announced on 17th February the offer of short service commissions in the Air Branch to candidates between the ages of 17½ and 23 years. The period is for seven years, of which the first two years will be occupied in training. After seven years, officers who volunteer may be retained on the Active List for a further period of eight years, and a few of those who complete fifteen years may be allowed to remain for a further period to qualify for retired pay. Those not retained on the Active List after seven years will be transferred to an Emergency List for eight years, during which they must keep themselves in flying practice. Those who enter under 22 will be rated Midshipman (A), and will be promoted to Sub-Lieutenant (A) at 22, or at any age over 20 if they have completed their training. Promotion to Lieutenant (A) will be after two years as Sub-Lieutenant (A).

TRANSFERS FROM R.A.F.—A limited number of officers who are serving or have served on short service commissions (including those extended to medium service) in the General Duties Branch of the Royal Air Force may volunteer for appointment to short service commissions in the Air Branch of the Royal Navy. Acting Pilot Officers will transfer as Acting Sub-Lieutenant (A), with the same seniority; Pilot Officers as Sub-Lieutenant (A) with the same seniority; Flying Officers as Lieutenant (A) with the same seniority provided this does not exceed two years (those with more than two years seniority will be granted two years only as Lieutenant (A)), and Flight Lieutenants as Lieutenant (A) with two years additional seniority. The period of service in the Navy will be seven years, with a possible extension to fifteen years, and some of those who complete the latter period may be retained to qualify for retired pay at 40 years of age or on completing 20 years service in the R.A.F. and R.N., whichever is later.

LOWER DECK PILOTS.—Naval ratings were made eligible to qualify as pilots of aircraft by an Admiralty Fleet Order dated 3rd March. They will be selected mainly from ratings of the seaman, signal and telegraphist branches, although men in other branches may volunteer at Admiralty discretion, and the age limits will be between 21 and 24. Initial training will be for about one year on shore, and then for eight weeks in a training carrier, and on its completion ratings will be confirmed as Petty Officers. Flying pay will be 2s. 9d. a day while under training, and 5s. a day when qualified, in addition to substantive pay according to rating. The first twenty candidates are to begin training in May.

PAY OF OBSERVER'S MATES.—From 24th February, the former rates of pay of 3s. 6d. a day for Acting Observer's Mates and 4s. a day for Observer's Mates were revised. The new rates are: Acting Observer's Mate, 4s. a day when held by a seaman rating and 3s. 6d. a day when held by a signal or telegraphist rating; Observer's Mate, 5s. a day when held by a seaman rating and 4s. 6d. a day when held by a signal or telegraphist rating. Payment of procedure and buzzer allowance (6d. a day) to seamen ratings employed on observer duties is discontinued.

ROYAL MARINES

FROCK COAT REINTRODUCED.—The King has approved certain modifications in the dress of Royal Marine officers. The frock coat is to be reintroduced except for Paymasters, Barrackmasters, Quartermasters and Warrant Officers, for whom it will be an optional garment. The present pattern greatcoat is to be replaced by one similar to that worn by the Army infantry officer. A boat cape is to be introduced as an optional garment, similar to that of the R.N. officer, but with crimson silk

lining. Two field service caps are also introduced, one a blue cap for wear on suitable occasions, such as on board ship when in mess kit, the other a khaki cap of the type approved for wear by Army officers.

DOMINION NAVIES

COMPARATIVE COST.—In a written answer to a question in the House of Commons on 11th March, the Parliamentary Secretary to the Admiralty gave the following figures of the cost per head of population in the current Naval Estimates for Great Britain, the Dominions, and India :—

Great Britain (including Northern Ireland)—£2 5s. 7d.
Commonwealth of Australia—10s. 10d.
New Zealand—9s. 0d.
India—0.02 rupees.
Union of South Africa—5.4d.
Canada—0.44 dollars.

The Parliamentary Secretary pointed out that the provision on which the figure for India is calculated includes a contribution of £100,000 towards the cost of ships in India waters, which will be remitted in future years.

ROYAL AUSTRALIAN NAVY

ANNIVERSARY CELEBRATION.—The Australian Squadron was at Sydney for the opening on 26th January of the celebrations of the 150th anniversary of Australia. There were also present the New Zealand cruisers "Achilles" and "Leander"; the United States cruisers "Trenton," "Memphis," "Louisville" and "Milwaukee"; the French sloop "Rigault de Genouilly"; the Italian cruiser "Raimondo Montecuccoli"; and the Dutch patrol sloop "Flores."

The First Lord of the Admiralty stated that it was a matter of regret that it had not been possible for the Royal Navy to be represented at the celebrations. After the Singapore exercises, however, H.M.S. "Dorsetshire" from the China Station left for Sydney, where she was to remain during the month of April.

ROYAL CANADIAN NAVY

VISITS TO WEST INDIES.—As in past years, vessels of the Royal Canadian Navy have visited Bermuda and West Indian ports during the past quarter.

NEW DESTROYERS.—The Canadian Government propose to purchase two more destroyers from the Admiralty, the "Comet" and "Crusader," for delivery in the summer. Built under the Navy Estimates of 1929, they are sister-ships to the "Crescent" and "Cygnet," which are now in the Canadian Navy as the "Fraser" and "St. Laurent."

NEW ZEALAND DIVISION, ROYAL NAVY

AUSTRALIAN CRUISE.—The "Achilles" and "Leander," under Rear-Admiral the Hon. E. R. Drummond, C.B., M.V.O., left Auckland on 20th January for their cruise to Australia, and did not return until the beginning of March. They visited Sydney, Jervis Bay, Melbourne and Hobart.

MARRIAGE ALLOWANCE.—The rates of marriage allowance payable to officers and men of the New Zealand Division were increased from 1st January to the maximum rates shown in the regulations. The increases varied from 1d. to 8d. a day.

ROYAL INDIAN NAVY

CONTRIBUTION REMITTED.—Sir James Grigg, Finance Member of the Government in India, in the course of his Budget statement for 1938–39 in the Legislative Assembly at Delhi on 26th February, announced that an agreement had been concluded with H.M. Government for the remission of the long-standing arrangement whereby India paid £100,000 yearly to Great Britain for naval defence. In return, the Government of India have agreed to maintain a seagoing fleet of not less than six modern escort vessels, which will be free to co-operate with the Royal Navy for the defence of India. India also accepts responsibility for the local defence of her ports.

At present there are five escort vessels in the Indian Navy.

FOREIGN

ARGENTINA

The destroyer "Santa Cruz," launched in August of last year, is now completing at the works of Messrs. Cammel Laird at Birkenhead. She is one of six vessels similar to the British "G" and "H" classes completing in Britain for the Argentine Navy. The remainder are the destroyers "San Juan" and "San Luis" completing at Messrs. John Brown's Yard; the "Corrientes," "Entre Rios" and "Buenos Aires" at Messrs. Vickers-Armstrongs' Barrow works, and the "Misiones," also at Cammel Laird's. Five more are projected.

BRAZIL

NEW CONSTRUCTION.—A minelaying sloop, the "Cananea," and a mine-sweeping sloop, the "Carioca," are building in the naval dockyard at Ilha das Cobras. The small monitor "Parnahyba" has carried out gun and machinery trials.

A contract has been signed with three British firms for the construction of six destroyers to cost approximately £2,600,000. These ships will be similar to the British "H" class of 1,350 tons and will be built by Vickers-Armstrongs, Thornycroft, and Samuel White & Co. Three submarines built in Italy, the "Tupy," "Tymbira" and "Tamoyo" have been delivered to the Brazilian navy.

FINLAND

Six small mine-sweepers named "Ahven," "Kiiski," "Muikku," "Särki," "Lahna" and "Kuore" have been completed at Turku. They are craft of 16 tons, with a draught of 4.3 feet, and a speed of 10 knots.

FRANCE

NEW CONSTRUCTION.—According to a statement made by the Minister of Marine, the 35,000-ton battleship "Richelieu" should leave the builders' hands in 1939.

The cruisers "Georges-Leygues," "Montcalm" and "Gloire," on completing their trials, joined the fleet at the end of last year.

The sloop minesweeper "Commandant-Duboc" was launched at Nantes on the 16th January. This class displaces 800 tons, and they are fitted with internal combustion engines of 4,000 h.p. which give them a speed of 20 knots. They have

an anti-aircraft armament of two 3.9 in. and machine guns, and carry depth charges for use against submarines. They are also fitted for mine-laying.

NAVAL AIR SERVICE.—According to a report in the French Press, the liaison between the Air Ministry and the Ministry of Marine is not functioning well in connection with the delivery of aircraft for the navy, and a commission of naval engineers is investigating the practicability of the Ministry of Marine supplying its own aircraft. This complaint is further supported by an article by Commandant Langeron in *Les Ailes*, in which he gives details of delays in supply and of defects in naval aircraft.

GERMANY

OFFICERS.—An analysis of the German Navy List, shows that the officer strength of the German navy is now roughly 50 per cent. of that of the British Navy (4,332 to 8,924), but the British figures include 1,232 Warrant Officers whose duties are performed by Chief Petty Officers in the German navy. The German figures include 1,527 Subordinate Officers, of whom about 300 will be seconded later to the Air Force. This Force (*Luftkreis VI*) is responsible for the coastal area as well as the fleet air arm. The naval officers shown as attached to it include three Lieutenant-Commanders, fifty-seven Lieutenants, and one hundred and sixty-two Midshipmen.

Promotion from the ranks is very limited; in 1937 there were nine executive officers, two engineers, twenty-three armament officers, and one paymaster promoted from this source.

NEW CONSTRUCTION.—The destroyer "Bruno Heinemann" has joined the fleet. She is one of the sixteen 1,625-ton craft belonging to the 1934 programme, details of which were given in these Notes for August, 1937. She is named after the First Officer of the S.M.S. "König," who was killed in November, 1918, by a red mutineer on board that ship in Kiel harbour for refusing to hoist the red flag.

ITALY

NAVAL POLICY.—In the course of a statement made by Admiral Ducci in the Senate on the Naval Estimates, he said that by 1941 Italy would have eight battleships, of which four would be of 35,000 tons. Her modern torpedo craft would compare with those of any other navy, and their total tonnage was on a par with that of France or with such strength in that class of ship as Great Britain could afford to maintain in the Mediterranean. Her present strength in submarines, a hundred and five, might appear enormous, but in war it would be impossible to keep more than a third of that number in commission owing to the need for refits and wastage among the crews. Fourteen of these submarines were ocean-going vessels, and twelve more were being built which would be able to reach Kisimayo on the Somaliland coast without refuelling.

It was difficult, he said, to find a perfect solution to the problem of the coast defence of Italy's naval bases owing to the new methods of air attack. It would be as well not to harbour too many illusions in regard to defence against the latter. The country had not many spacious natural ports, and those which existed "had lost much of their value as a result of the changed political situation." The construction of a third big dock in southern Italy was indispensable.

JAPAN

NEW BATTLESHIPS.—The Japanese Government, with that passion for secrecy which is a marked national trait, still declines to state definitely whether Japan is building or intends to build battleships exceeding the 35,000 tons agreed upon by

Britain, the United States and France at the London Naval Treaty of 1936. It remains to be seen whether the decision of those Powers announced on the 31st March to claim the Escalator Clause and thereby free themselves to build larger ships, will induce the Japanese to disclose their plans. It should be clear to them that if they build excessively large battleships they are inviting a race which ultimately they are bound to lose and which will tax their resources, perhaps to breaking point.

LANDING CRAFT.—Four types of craft were used in connection with the landing operations at Tangku and Shanghai. They were as follows :—

(1) Coastal motor boat type, used as despatch boats.
(2) An armoured craft, something like a motor launch, 50 feet long and with a speed of 10–12 knots, armed with two machine guns and a pom-pom. Accommodation for the crew all under armour.
(3) A small military landing craft of 45 feet and a speed of 8 knots, having a capacity for 40 men with a machine-gun position in the bows. Draught about 3 feet.
(4) Large military landing craft of 56 feet and a speed of about 8 knots and a capacity for 90 men. Worm type of propeller in tunnel, engine and steering position aft, and protected. Draught about 3 feet.

These craft were all transported in a vessel of about 10,000 tons with a hangar forward. Deck stowage for craft in category (2) is aft, for category (3) amidships on the top deck. Hatches in the ship's side at the water-line gave access to category (4). landing craft. Large flap doors give access to a flat stern over which it is believed the landing craft are launched.

A fifth type of landing craft in use appeared to be like a small fishing vessel, which operated independently of a carrier.

PORTUGAL

BRITISH MISSION.—A British Services Mission arrived at Lisbon on the 20th February. It includes Rear-Admiral N. A. Wodehouse, Colonel Daly, Group Captain R. M. Field, R.A.F., Wing-Commander P. R. T. Chamberlayne—Assistant Air Attaché in Lisbon, Major R. F. G. Jayne—Assistant Military Attaché, and Paymaster Lieutenant E. J. Webb, R.N.

Brigadier Tasso de Miranda Cabral—Deputy Chief of the General Staff, Captain Botelho de Souza—Portuguese Navy, and Air Lieut.-Colonel Antonio Maia—commanding the fighter forces at Tancos Aerodrome, have been appointed Liaison Officers by the Portuguese Government. It is understood that the British Mission will advise the Government in connection with the reorganization of Portugal's defences and fighting Services.

SWEDEN

NAVAL ESTIMATES.—A sum of Kr. 45,565,000 (approximately £2,348,000) has been allotted to the navy for the current financial year. This is about Kr. 2,250,000 less than the previous year. It includes Kr. 7,600,000 for new construction and Kr. 2,800,000 for coast artillery.

NEW CONSTRUCTION.—The destroyer " Stockholm " and submarine " Sjölejonet" have been completed. Warships under construction include two destroyers, two submarines, four mine-sweepers, and a fishery protection vessel.

SHIPS TO BE SCRAPPED.—The two old coast-defence ships " Odin " and " Thor " have been struck off the effective list. Before being finally scrapped it is proposed to use them for experimental purposes, including target practice and bombing.

UNITED STATES

NAVAL POLICY.—On 29th January the President, in a message to Congress, recommended that the existing authorized building programme be increased by 20 per cent. Previously, naval construction in the United States was governed by the Vinson Trammell Act of 1934, which authorized the annual programme for the replacement of over-age vessels and prohibited building in excess of the original London and Washington Treaties. Little more than a week before this message, a sum of £110,000,000 had been voted for the 1938–39 construction programme under that Act. The new programme, if approved by Congress, will add the following units to those detailed under the 1938–39 programme in last quarter's Notes :—

3 battleships	making a total of		18
2 aircraft carriers	"	"	8
8 cruisers	"	"	47
25 destroyers	"	"	147
9 submarines	"	"	58
1,000 aeroplanes	"	"	3,000

It is estimated that in connection with this programme an increase of 1,200 officers and 20,000 men will ultimately be necessary.

It is proposed to lay down immediately the two battleships and two cruisers in addition to those provided for in the 1938–39 programme, and to allow an additional $15,000,000 in the 1938–39 estimates for the construction of a number of experimental small vessels of a new type.

VISIT OF CRUISERS TO AUSTRALIA AND SINGAPORE.—By invitation of the Government of Australia the United States cruisers " Louisville," " Trenton," " Milwaukee" and " Memphis," commanded by Rear-Admiral J. C. Townsend, visited Sydney to take part in the celebrations of the 150th Anniversary of the Botany Bay settlement in Australia on the 26th January last. On the 13th February the cruisers arrived at Singapore, by invitation of the British Government, to take part in the official opening of the Singapore Naval Dock.

MERCHANT SHIP CONSTRUCTION.—Under an agreement with the United States Maritime Commission, the Standard Oil Co. of New York are to construct twelve tankers of a character which will be suitable for use by the navy if necessary. These vessels will have a speed of 18 knots and a cruising speed of 16½ knots. They will have a cargo capacity of 150,000 barrels. They will be prepared to mount guns and searchlights, and will be fitted with arrangements for oiling at sea, paravanes and 40-ton lifting gear.

In addition to these tankers and twelve other cargo vessels, the Commission has recommended the construction of 53 ships at a cost of approximately $110,000,000. These would be built under long-term subsidy agreements, and would include a liner to replace the " Leviathan," costing about $17,000,000. It is stated that they would constitute a valuable reserve of auxiliaries for the navy.

The Commission does not favour building giant liners like the " Queen Mary " and " Normandie," as these are considered to be uneconomical, useless for defence in war time, and more likely to be subject to the competition of trans-ocean aircraft than ordinary passenger vessels would be.

ARMY NOTES

HIS MAJESTY THE KING

THE HERTFORDSHIRE REGIMENT.—Her Majesty the Queen has been appointed Honorary Colonel, 1st Battalion, The Hertfordshire Regiment, Territorial Army. Her Majesty was born in Hertfordshire, her parents, the Earl and Countess of Strathmore being in residence at St. Paul's, Walden, near Hitchin, at the time.

COLONEL-IN-CHIEF OF CANADIAN REGIMENTS AND CORPS.—His Majesty the King has graciously consented to become Colonel-in-Chief of the following Canadian Regiments and Corps: 17th Duke of York's Royal Canadian Hussars; Royal Canadian Artillery; Corps of Royal Canadian Engineers; The Royal 22e Régiment; The Royal Hamilton Light Infantry; The Cameron Highlanders of Ottawa The Winnipeg Grenadiers.

Her Majesty the Queen has been appointed Colonel-in-Chief, The Toronto Scottish Regiment (Highlanders).

AIDES-DE-CAMP TO THE KING.—The following officers have been appointed Aides-de-Camp to the King:—

Brigadier F. H. Maynard, C.B., D.S.O., M.C., Indian Army.
Brigadier C. S. Tute, Indian Army.
Brigadier G. N. Ford, C.B., D.S.O., Indian Army.
Brigadier W. M. Sutton, D.S.O., M.C.
Brevet-Colonel E. Gore-Browne, D.S.O., T.D., The Leicestershire Yeomanry.

COLONELS OF REGIMENTS AND CORPS.—Lieutenant-General B. D. Fisher, C.B., C.M.G., D.S.O., to be Colonel, 17th/21st Lancers. General Fisher joined the 17th Lancers in 1900 and vacated command of the 17th/21st Lancers in 1923.

Major-General Sir M. Graham E. Bowman-Manifold, K.B.E., C.B., C.M.G., D.S.O., to be Colonel Commandant, Corps of Royal Engineers, which he joined in 1891.

His Excellency Major-General Sir Edward N. Broadbent, K.B.E., C.B., C.M.G., D.S.O., to be Colonel, The King's Own Scottish Borderers. General Broadbent was commissioned to the Regiment in 1895, and is now Lieutenant-Governor of Guernsey.

ROYAL HOSPITAL, CHELSEA.—The King has been pleased to appoint General Sir Harry H. S. Knox, K.C.B., D.S.O., as Governor of the Royal Hospital, Chelsea, from 27th October, 1938. Sir Harry Knox was Adjutant-General to the Forces until the beginning of December, 1937, when he resigned in order to facilitate the promotion of younger officers.

The King has been pleased to approve the appointment of Major-General H. J. Huddleston, C.B., C.M.G., D.S.O., Colonel, The Dorsetshire Regiment, to be Lieutenant-Governor and Secretary, Royal Hospital, Chelsea, from 2nd June, 1938. General Huddleston served in the ranks of the Coldstream Guards and received a commission in The Dorsetshire Regiment in 1900. He has a fine record of service in Egypt, Mesopotamia and the Sudan.

Promotions

The War Office has announced the following :—

Major-Generals.—Colonel (temp. Brigadier) R. T. Snowden-Smith, C.B.E., M.I.M.E., and Colonel W. B. Purdon, D.S.O., O.B.E., M.C., M.B., late R.A.M.C., to be Major-Generals, from 2nd February and 1st March, 1938, respectively.

Colonel (temp. Brigadier) H. R. Pownall, C.B., D.S.O., M.C., to be Major-General, from 26th March, 1938, and to be Director of Military Operations and Intelligence, The War Office.

Appointments

Major-General L. L. Hoare, D.S.O., R.A.O.C., to be Principal Ordnance Officer, The War Office, from 8th February, 1938.

Major-General F. P. Nosworthy, D.S.O., M.C., to be Deputy Chief of the General Staff, India, from 18th July, 1938.

Major-General M. G. H. Barker, C.B., D.S.O., to command the Baluchistan District, India, from 2nd June, 1938.

Major-General D. K. Macleod, C.B., D.S.O., to be General Officer Commanding, Burma, from May, 1938.

Major-General F. L. Nicholson, C.B., D.S.O., M.C., to be Commander, Lucknow District, India, from 16th March, 1938.

ARMY ESTIMATES

The Army Estimates for 1938 [1] amounted to £85,357,000, an increase of £22,237,000 over those for 1937. During 1938, it is further proposed to meet Army expenditure on equipment and Works services for the Regular Army to the extent of £21,143,000 by issues under the Defence Loans Act, 1937. This marked increase in the Estimates is a measure of the progress that is being made in the programme for bringing our military preparations up-to-date. The question of the role of the Army has been re-examined by the Government in the light of present-day circumstances. The problem of securing an adequate flow of recruits to the Regular and Territorial Armies has caused concern but the steps already taken—or to be taken—will, it is hoped, lead to a satisfactory solution. Changes in the War Office, introduced with the object of ensuring the co-ordination and expediting the despatch of business include the institution of a Commander's Conference, at which the G.O.Cs-in-Chief are brought into consultation with the War Office on matters of general Army policy; the creation of a Standing Committee of the Army Council for the consideration and disposal of current affairs; the amalgamation of the departments of the Director-General of Munitions Production and the Master-General of the Ordnance; and the appointment of a Deputy to the Chief of the Imperial General Staff, who will thus be freed from administrative routine.

Regular Army

Establishment and Distribution.—The total of Vote A amounted to 170,000, as compared with 168,900 in 1937. Although the establishment of the Army has not been increased materially, various adjustments of personnel between arms to meet changes in organization have been effected. The Government does not propose

[1] This Summary is based on the Memorandum of the Secretary of State for War relating to the Army Estimates, 1938. (H.M. Stationery Office; price 2d.)

to raise, in 1938, the remaining two of the four infantry battalions referred to in the Statement relating to Defence, 3rd March, 1936. The normal distribution of the principal units remains generally as in 1937, though certain changes have been made to suit local conditions. The establishment of horses has decreased further by 1,762 and stands at 5,205 as compared with 28,742 in 1914. Of the Cavalry of the Line, two Regiments will eventually remain horsed and the remainder will be mechanized; by the end of 1938, the fifteen Regiments on the British Establishments will include twelve mechanized Regiments. As regards the British Cavalry in India, the policy of mechanization has been accepted and has already been introduced in the case of two Regiments.

The 8th Battalion, Royal Tank Corps, will be formed at home. Mechanized Cavalry Regiments in India will perform the functions hitherto discharged by units of the Royal Tank Corps.

Reorganization of the Royal Artillery.—The responsibility for Anti-Aircraft and Coast Defence Searchlights will be transferred from the Royal Engineers to the Royal Artillery. The Royal Artillery will be reconstituted in two separate branches; one to comprise horse, field and medium batteries; the other to include Anti-Aircraft and Coast Defence Artillery and Searchlights.

Strength and Recruiting.—The strength of the Regular Army, inclusive of British Troops in India and Burma, at the beginning of the financial year, 1938–39, will fall short of approximately 1,200 officers and 22,000 other ranks of the full establishment. During the year, about 32,000 other ranks will leave the Colours. The intake of recruits for 1938 is estimated at approximately 28,500 compared with 22,800 for the year ending 31st March, 1937. The improvement in recruiting, which began to be evident from early in August, 1937, has continued steadily. Highly valued assistance to the recruiting campaign has been afforded by the British Broadcasting Corporation, the Press and the Films Industry.

Tours of mechanized columns to various parts of the country have been welcomed by the civil population and every facility and assistance have been proffered by the local authorities. These visits have done much to spread the knowledge of the progress of mechanization in the Army.

The physical development depot, formed at Aldershot during 1937, to deal with below-standard recruits has been placed on a permanent basis at Canterbury. Of a total of 789 recruits who were drafted to this depot between May, 1937, and January, 1938, 464 have joined unit depots, and 260 are still under training; the balance have been discharged as unlikely to reach the required standard. Below-standard recruits are given special diet and remedial treatment according to individual needs.

Army and Supplementary Reserves.—The strength of the Army Reserve at the beginning of the financial year amounted to 130,000, and should rise to 142,000 by the end of the year. The Supplementary Reserve—inclusive of the new infantry section—stood at 25,000 of all ranks. At the present increased rate of recruiting, the strength by the end of 1938 should rise to about 30,500. The infantry section of the Supplementary Reserve, formed in 1936, obtained 4,984 recruits between September, 1936, and January, 1938, of whom 1,716 enlisted in the Regular Army; the strength should rise to about 5,800 by the end of the year.

Territorial Army

The strength of the Territorial Army—exclusive of Permanent Staff—on 1st January, 1938, totalled 9,046 officers and 149,797 other ranks, an increase of 1,176 officers and 16,514 other ranks in twelve months. Annual training camps were

attended by 7,825 officers and 131,301 other ranks; corresponding figures for 1937 amounted to 6,817 and 116,707 respectively.

Various decisions have been taken to enhance the status of and improve the conditions in a force, the significance of whose role in the defence of the country is gradually becoming more clearly understood. The Director-General of the Territorial Army has been appointed to a seat on the Army Council; the office of Deputy Director-General has been created and filled by a Territorial Army officer with the rank of Major-General; a Territorial Major-General has been appointed to command the London Division; vacancies at the Imperial Defence and Staff Colleges have been assigned to Territorial officers; and a Committee has been set up to reorganize the conduct of the administrative and financial business of the Territorial Army.

A Territorial Army and Air Force Association for the County of Antrim was formed last April; Territorial Army units are being raised in Northern Ireland; and recruiting is proceeding most satisfactorily.

Officer-producing Units.—The 22nd (London) Armoured Car Company (Westminster Dragoons), the Inns of Court Regiment and the Artists Rifles have been converted into Officer-Producing Units. The 11th (H.A.C. and City of London Yeomanry) Brigade and the Honourable Artillery Company, Infantry Battalion, have agreed to form sub-units as Officer-Producing Units. These changes will facilitate the provision and training of officers in the event of war.

The conversion of further units has enabled the original programme of 76 Anti-Aircraft batteries, R.A., and 108 Searchlight Companies, R.E., to be completed.

All Anti-Aircraft and Coast Defence Units have been authorized to recruit up 10 per cent. over establishment, thus bringing them into line with the remainder of the Territorial Army.

The building programme required for the 1st Anti-Aircraft Division is approaching completion with the exception of a few cases where unusual difficulties in acquiring a suitable site have been encountered. Rapid progress is being made in the provision of accommodation for the 2nd Anti-Aircraft Division, located in the Midlands and North. Further extensions of Anti-Aircraft defences into North England and Scotland are being planned. The Secretary of State has paid a warm tribute to the public spirit displayed by all those units, that have accepted conversion to new roles and different arms of the service, at the cost of severence of their traditional associations. He has also offered the thanks of H.M. Government to employers who have rendered it possible for recruits to join the Territorial Army and to attend annual training camps.

Training.

The following measures will be applied for training in 1938:—

(*a*) Suffolk, and parts of Berkshire, Hampshire, Sussex and Wiltshire to be known as "the Aldershot Command and Salisbury Plain Manœuvre Areas"—will be brought within the scope of the Manœuvres Acts;

(*b*) The 1st and 2nd Divisions from the Aldershot Command will carry out Brigade and Inter-Brigade training in the Aldershot Command manœuvre area, during August and September;

(*c*) The 4th Division will carry out training in August and September, in the Suffolk area;

(*d*) The Mobile Division and the 3rd Division will carry out Brigade and Inter-Brigade training during August and September, in the Salisbury Plain Manœuvre Area ;

(*e*) An infantry brigade and attached troops from the Southern Command will take part during July in combined operations with the Royal Navy.

(*f*) The 5th Division will carry out Brigade and Inter-Brigade training mainly in the Catterick area.

(*g*) A Territorial Army Camp is to be held in the Special Area of the Gower Peninsula, Glamorgan.

(*h*) A War Office skeleton exercise will be held in September.

Works

Special attention is being devoted to Works Services: barracks are being erected for new Tank battalions at Warminster and Lavington ; for the 2nd Anti-Aircraft Group at Shrivenham ; and for an Armoured Fighting Vehicles School at Bovington. Old barracks, such as a cavalry barracks at Aldershot, Preston Barracks at Brighton, artillery barracks at Newcastle and Edinburgh, and infantry barracks at Devonport are to be replaced.

Armaments and Research

The rearmament of Coast Defences at home and abroad is proceeding according to programme and the issue of anti-aircraft equipment is being accelerated. Rapid progress has been made in the conversion of Field Artillery carriages with pneumatic-tyred wheels ; and in the design and production of various weapons, including " Bren " light machine guns and Anti-Tank guns, types of ammunition, armoured fighting vehicles, machine-gun carriers, and engineering and signal equipment. Full use is being made of commercial practice and experience in relation to the general problems of mechanization.

The complexity of modern methods of warfare, combined with the special demands of the Defence Programme, has presented difficult and urgent tasks to the military research and experimental establishments. The past year has witnessed intensive work in all fields and the workers, whether scientists or members of the War Office staffs, have made notable contributions to the solution of intricate problems.

Munitions Production

The two departments of the Director-General of Munitions Production and the Master-General of the Ordnance have been amalgamated under the single control of the former ; the office of Master-General of the Ordnance has fallen into abeyance, but a Deputy Master-General of Ordnance has been appointed to assist the Director-General of Munitions Production. The post of Director of Scientific Research has been created.[1] The functions of this official will be to advise on fundamental research problems and to co-ordinate the research work of the various establishments and committees, that work under the War Office.

[1] This measure was strongly advocated by Professor J. B. S. Haldane, F.R.S., in his lecture, " Science and Future Warfare," delivered on 13th October, 1937, at the Royal United Service Institution.

Speech by the Secretary of State for War

The following are the chief points taken from the speech by the Secretary of State for War—Mr. Hore Belisha—on 10th March, 1938, when introducing the Army Estimates in the House of Commons, and from explanatory Memoranda.

The British Army in India.—The fact that the number of British Army units to be stationed in India is pre-determined produces an element of rigidity in the strategical distribution of units at home and abroad, and also affects the organization of the rest of the Army and the terms of service and amenities of the soldier. With the object of examining these questions, inter-departmental discussions between the War Office and the India Office are to be initiated under the auspices of the Prime Minister.

The Role of the Army.—The role of the Army comprises a number of different purposes; *in order of importance* these are :—

Home Defence

(*a*) *Air Defence.*—In co-operation with the Royal Air Force, the Territorial Army is responsible for the air defence of Great Britain. Increase of strength can be provided from Regular Anti-Aircraft units if they are present in this country.

(*b*) *Internal Security.*—All troops at home, whether Regular or Territorial, will be practised in helping the civil population, particularly in measures to counteract the effect of air attack.

(*c*) *Coast Defence.*—The defence of the coasts is one of the responsibilities of the Territorial Army.

The Discharge of our Commitments Overseas

Twenty-eight British battalions are now stationed overseas (excluding forty-four in India and two in Burma).

Strategic Reserve

The functions of the strategic reserve include the following :—

(*a*) Internal security.

(*b*) Defence against external attack of British territories overseas.

(*c*) Co-operation in the defence of the territories of any allies we may have in case of war.

Organization of Divisions

In order to provide a thoroughly flexible organization there will be two types of division and, further, variations within types, viz. :—

(*a*) *Motorized Division.*—Based on the Light Machine Gun, supported by artillery according to need. For internal security operations (e.g., Palestine), a Division may consist of only six battalions. When used for war, a Division may consist of nine battalions. These battalions will possess fifty Bren guns each. One Heavy Machine-Gun battalion per division will be retained as Corps Troops. The remaining Heavy Machine-Gun battalions can be more usefully converted to Light Machine-Gun units.

(*b*) *Mechanized Armoured Division.*—The Armoured Division will be based on the Tank.

REORGANIZATION OF THE ROYAL ARTILLERY.—Anti-tank guns will be transferred to the Royal Artillery, who will man them in future. The artillery " fire unit " will, in future, consist of twelve guns instead of six, as formerly.

The decision to reorganize the Field Artillery of the Regular Army on the basis of a twelve-gun fire unit implies an organization comprising Brigade H.Q. and two " Fire Units " each of three four-gun batteries. The total number of guns normally available for the support of a Division will not be affected. The primary object of this reorganization is to provide for greater tactical flexibility and increased facility for the control of fire.

Hitherto the fire unit has been the battery of six guns, a unit which, in the new conditions, does not readily lend itself to the application of rapid and accurate concentrations of fire. By increasing the volume of fire controlled by one H.Q., greater accuracy and speed should be attained. The new organization is further designed to provide the means of more effective liaison between the artillery and other arms, especially the infantry, by the introduction of a new link in the chain of control. It will also enable reinforcing artillery to be absorbed with the minimum of dislocation. For convenience in siting, the four-gun battery is more easily manœuvrable and more readily fitted on the ground.

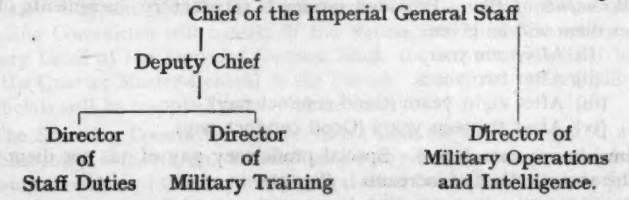
As regards communications, the Royal Corps of Signals has hitherto been responsible for all communications down to batteries. Under the proposed system communications between the new " Fire Unit " H.Q. and batteries will be the responsibility of R.A. personnel. This adjustment should prove of advantage in the handling of technical messages relating to the artillery.

The centralization in the " Fire Unit " H.Q. of a high proportion of the ammunition, which has hitherto been carried in battery vehicles, will result in greater flexibility in the system of ammunition supply.

Finally, the introduction into the organization of a new " Fire Unit " H.Q. will effect an economy both in personnel and in vehicles.

GENERAL STAFF REORGANIZATION

The General Staff will be reorganized in accordance with the table given below :—


Chief of the Imperial General Staff
Deputy Chief
Director of Staff Duties
Director of Military Training
Director of Military Operations and Intelligence.

A small section of the General Staff will be established to study the practice and lessons of actual warfare.

PERSONNEL

WARRANT OFFICERS—CLASS III.—The introduction of the rank of W.O. Class III will increase the prospects of promotion of the other ranks. It will also effect a reduction in the number of subaltern officers required to command platoons which, in turn, will enable all officers to rise more rapidly.

WILLINGDON COMMITTEE.—The report of this committee on the Supply of Army Officers is now receiving Inter-Departmental consideration on the issues involved.

COLONIAL ALLOWANCE.—The Colonial allowance has been increased at an extra cost of £180,000 per annum on the present distribution of troops.

CHANGES OF STATION.—A new allowance provides that an officer shall receive £20 and an other rank £5 to meet expenses on change of station. The total cost will amount to £70,000 per annum.

The quantity of officer's furniture to be moved free on change of station will be increased from three tons to a maximum of eight tons, according to rank. The total cost will be £14,500 per annum.

IMPROVED LIVING CONDITIONS FOR THE SOLDIER :—

(*a*) Modernization of Barracks; £800,000 more will be spent this year than last.
(*b*) Improved furnishing; £87,000 to be allotted this year.
(*c*) Appointment of an Adviser on Catering.[1]
(*d*) Butter to be issued at stations abroad. The cost will be £12,000 per annum.
(*e*) Half a pint of milk a day for all recruits, when recommended by the Medical Officer.

ENLISTMENT OF BOYS.—Enlistments open to boys will be available this year up to the following numbers :—

(*a*) 1,500 boys for training as ordinary soldiers.
(*b*) 2,000 boys for training as tradesmen.

Whilst undergoing training as boys, those enlisted under (*a*), above, will receive one free railway warrant a year for furlough purposes, and those under (*b*), two warrants.

TERMS OF SERVICE.—As a provisional measure two terms of service will be introduced, viz. :—

(*a*) Short Term as at present.
(*b*) Long Term for twelve years with power to re-engage for pension.

Numbers enlisted under (*b*) will be controlled and the measure is experimental. For the long term soldier, completing twenty-one years, there will be a pension.

INCREASED FINANCIAL BENEFITS :—

(*a*) *Increments of Pay.*—Provided service is satisfactory, increments of 3d. per diem will be given :—
  (i) After one year.
  (ii) After two years.
  (iii) After eight years (Good conduct pay).
  (iv) After thirteen years (Good conduct pay).

The increments are cumulative. Special proficiency pay of 3d. per diem is in addition to the above. Cost of increases : £850,000 in 1938.

(*b*) *Family Allowance.*—The family allowance will be increased from the present rates of 7s. to 10s. a week to 17s. for all married soldiers over 26 years of age, in addition to 5s. 6d. for the first child, 3s. 6d. for the second child and lower rates in respect of each additional child. A soldier to whom free quarters are allotted will not receive the allowance of 17s. in respect of the wife. Cost of increases : £360,000 in the first year.

DISCHARGE ON MEDICAL GROUNDS.—In future men discharged on medical grounds will be granted twenty-eight days furlough on full pay.

[1] Sir Isidore Salmon, Chairman and Managing Director of Messrs. J. Lyons & Co.

RESERVISTS AND UNEMPLOYMENT ASSISTANCE.—In the case of reservists, who are applicants to the Unemployment Assistance Board, the first 5s. of the weekly amount due on account of reserve pay will, in future, be allowed for personal requirements; the additional 6d. a day, which a Section "A" reservist draws, will also be allowed free. Reservists, who enlisted after 30th September, 1931, will not in effect have any of their pay taken into account for unemployment assistance. The reservist will also be given the option of having his pay dealt with on a weekly or quarterly basis.

CONCESSIONS TO OFFICERS AND MEN.—The concessions to officers and men of the Regular Army amount to £1,600,000, apart from the building programme, in 1938.

TERRITORIAL ARMY

The findings of the Committee set up to enquire into the finance and administration of the Territorial Army are not yet available.

The total additional income to be allotted to Territorial Army Associations in 1938 is approximately £110,000.

Substantial increases over the existing rates are to be made in the grants to Anti-Aircraft units.

A grant is being made towards the cost of bands in Anti-Aircraft units.

Grants to provide for the employment of a full time clerk at the headquarters of units other than Anti-Aircraft units with an establishment of 300 or over.

In future payment of fares to and from Drill Halls will be admissible up to fifty attendances and not fifty drills as heretofore.

H.M. the King has been pleased to approve a badge for wear out of uniform to symbolize service in the Territorial Army. Their Majesties the King and Queen, as Honorary Colonels of T.A. units, have accepted the first two badges issued.

GENERAL

ARMY COUNCIL STANDING COMMITTEE.—The nucleus of the Army Council Standing Committee will consist of the Permanent Under-Secretary of State, the Deputy Chief of the Imperial General Staff, the Adjutant-General to the Forces, and the Quarter-Master-General to the Forces. Other Army Councillors, Directors, or officials will be co-opted as may be necessary.

The Standing Committee will be responsible for the conduct of, and advice to the Secretary of State on, all matters of day-to-day Army administration, thus relieving the Chief of the Imperial General Staff from all detailed work in order that he may be free to advise the Secretary of State on the broad questions of high policy.

COMMANDERS COUNCIL.—Conferences have begun between the Chief of the Imperial General Staff and the Commanders of 1st Class Commands. They are being held to give effect to the announcement made by the Secretary of State for War, in connexion with the recent Army Council changes, when he stated that in future the Commanders of war formations would be more closely associated with the control of military policy.

COURTS-MARTIAL COMMITTEE.—The Secretary of State for War has appointed a Committee to enquire into certain aspects of the existing system of trial by Court-Martial. Mr. Roland Oliver, K.C., has consented to be Chairman of the Committee.

The terms of reference are as follows :—

"To examine the existing system of trial by Court-Martial under the Army and Air Force Acts and matters incidental thereto, and in particular to consider whether it is desirable and practicable that a person convicted by Court-Martial should have a right of appeal to a civil judicial tribunal against his conviction, and to make recommendations."

The Members of the Committee are :—

Mr. Tristram Beresford, K.C.
The Rt. Hon. Sir Felix Cassel, Bt., K.C.
The Hon. Member for Chester-le-Street (Mr. J. J. Lawson, M.P.).
Air Vice-Marshal C. A. H. Longcroft, C.B., C.M.G., D.S.O., A.F.C.
General Sir Felix Ready, G.B.E., K.C.B., C.S.I., C.M.G., D.S.O.

Work is to start at once.

COMMISSIONS IN THE REGULAR ARMY.—The War Office has announced that twenty-five vacancies for commissions in the Cavalry, Royal Artillery, Royal Corps of Signals, Infantry and Royal Tank Corps of the Regular Army will be available for competition at the examination to be held in June, 1938, for candidates from among officers of the Supplementary Reserve and the Territorial Army. In addition, a limited number of vacancies for the Indian Army may be available. Successful candidates, provided that they have attained the age of 21 years, will be appointed on or about the 26th August, 1938. Full particulars of this method of entry to the Commissioned ranks of the Regular Army may be obtained from the Under-Secretary of State (M.T.4A.), The War Office, London, S.W.1.

PROMOTION FROM THE RANKS.—In answer to a question in the House of Commons, Mr. Hore-Belisha—Secretary of State for War, stated on 2nd March, 1938, that the approximate number of officers of the British Army, who had risen from the ranks was 2,090. This was about 17 per cent. of the total officer strength. The number promoted during the last ten years was 981.

TRAINING MANUAL.—A new Military Training Manual which marks a complete departure from the style which has hitherto prevailed in Military publications has been prepared by the War Office. For the first time a book has appeared which will not only prove both interesting and instructive to the soldier, but will at the same time prove of considerable interest to the lay mind. The manual is entitled "Right or Wrong, Elements of training and leadership illustrated"; it relies entirely for its instructional value upon a series of pictures supported by brief captions. The pictures are clear, simple, and in some cases amusing, and cover a very wide field. They, in fact, as the title implies, show in the clearest manner possible the right and the wrong way of carrying out some of the soldier's many duties in war.

The manual is to be issued free down to section leaders of Infantry, Nos. 1 of Artillery, and corresponding ranks in other arms. It is difficult to imagine a more admirable method of explaining to young N.C.Os whose duty it is to lead their men in war, exactly what this duty comprises. The book can be purchased from H.M. Stationery Office, or from any booksellers, price 6d.

ACTIVE SERVICE CLOTHING.—Trials are to be carried out this year with an experimental design of clothing for active service and training, which has been evolved with a view to meeting the needs of mechanization. During 1933 and 1934, trials were carried out with a new pattern uniform designed for the marching soldier. This was found to be efficient for the purpose for which it was designed. The mechanization of the Infantry, however, had not then been effected. In 1936

and 1937, trials were carried out by mechanized cavalry with a two-piece suit of similar pattern to that worn by the Royal Tank Corps, with satisfactory results. A blouse outfit for personnel of machine-gun battalions abroad was also devised and worn in Egypt last year.

The experimental clothing to be tried out this year is of the overall type, and the main features are :—

Cap.—Comparative trials will be made with the " deer-stalker " pattern, as in the trials carried out in 1933 and 1934, and with the present Field Service cap.

Blouse.—The design is similar to that worn by the Royal Tank Corps, and has a collar which can be worn either open or closed. For the purpose of comparative trials, some of the blouses will have " zip " fasteners instead of buttons.

Trousers.—These are designed on the lines of " ski-ing " trousers, being loose-fitting, and buckled at the ankles.

Shirt.—The shirt has a collar attached which can be worn inside the collar of the blouse when the latter is closed or, alternatively, outside when the blouse collar is open.

Gaiters.—These are of canvas and of a type already tried out during the experiments held in 1933 and 1934. It is considered that these will be required by troops of those arms which fight on foot, but may not be necessary for personnel of other arms, including those in armoured fighting vehicles.

The material used for the cap, blouse, and trousers is known as " denim," and is stronger and heavier than the existing overalls' material, which it resembles. " Denim " is not so warm as the serge used for the existing service dress uniform, and for that reason additional underclothing will be worn.

Automobile Association Supplementary Reserve.—The Army Council has for some time had under consideration the new problems of traffic control which have arisen through the increase in mechanization of the Army. It is clear that highly trained personnel will be needed to deal with these problems. After discussions between the War Office and the Automobile Association it has been decided to form a Supplementary Reserve to the Corps of Military Police, which Reserve shall be recruited exclusively from the road staff of the Automobile Association. The total number to be provided will be 500. Enlistments will be for four years in the first case, with provision for extension, and applicants will be required to carry out fourteen days training annually during specially arranged periods.

Army, Home and Empire Defence League.—The Army, Home and Empire League has been formed to focus public attention on the urgency of our defence problems. The League is non-political and appeals to all patriotic citizens for their support. Lord Willingdon has consented to act as President. The League office is at 2 Chesham Place, London, S.W.1, and Associate Membership costs only 1s. per annum.

Aldershot Tattoo.—The Secretary of State for War, speaking recently in the House of Commons, stated that he had an open mind on the subject of the Aldershot Tattoo. The Tattoo was alleged to be a waste of time. On the other hand, it was said to provide training in the movement of large bodies of men with exact timing and co-operation in traffic control with civilian authorities and showed the Army to the public. Large sums had been raised for military charities by the Tattoo.

"I do not feel in a position to say, here and now, that the Tattoo should be abolished," he added. "If the case is made out and it were to become the feeling that this is not an occupation in which the Army should indulge, we should be only too happy to entertain the objection."

Judging from correspondence received by the Editor of the JOURNAL from serving officers, it would appear that many would "be only too happy" if all Tattoos were abolished.

WAR DEPARTMENT VESSELS.—That the Army runs its own Navy is a fact which is not generally known. The Shipping Establishment, Woolwich Arsenal, controls a fleet of 225 vessels and boats and spends over £300,000 annually on their upkeep and on the wages of crews, pilotage and towing charges. During the current year, the sum of over £200,000 is to be devoted to the purchase of new vessels. This fleet is used for towing artillery targets and in connection with other forms of military training and for the conveyance of personnel, stores and heavy guns. Normal commercial vessels are not suitable for target towing or for the transport of heavy artillery. Some vessels make voyages to Ireland as well as coastwise and effect a considerable saving in the cost of hiring.

TERRITORIAL ARMY

RECRUITING.—During February, 1938, the strength of the Territorial Army rose by 79 officers and 2,979 other ranks, and its total strength is now 9,183 officers and 152,782 other ranks. During the month 5,678 recruits were enlisted, being an increase of 702 over the corresponding month of last year. This is a record for any February since the Territorial Army was reformed after the War. Recruiting for the anti-aircraft units was very good. The 1st Anti-Aircraft Division obtained 930 recruits and the 2nd, 786.

The three leading Divisions on 1st March, 1938, were :—

	Peace Establishment.	*Strength.*	*% of Establishment.*
51st (Highland) Division	9,900	9,643	97·4
55th (West Lancashire) Division ..	9,494	8,666	91·3
42nd (East Lancashire) Division ..	9,851	8,894	90·3

INFORMATION BUREAU.—With the support of the Lord Mayor of London—Sir Harry Twyford—a Territorial Army Information Bureau was opened at the Mansion House. During the past few months, the number of enquiries at the War Office emphasized the necessity for a central office supplying advice and information to potential recruits. No direct recruiting was attempted at the Bureau, but the results surpassed all expectations. Enquiries from eligible young men averaged about 3,000 per day for the week during which the Bureau was open.

TERRITORIAL BADGE.—The Secretary of State for War has announced that a silver badge has been authorized to be worn by officers and other ranks of the Territorial Army when out of uniform, to indicate their membership. The badge will be the same for all ranks and the King and Queen have agreed to accept the first two to be issued.

GOLD LACE FOR OFFICERS.—His Majesty the King has been graciously pleased to approve of gold lace and embroidery being substituted for silver on the uniforms of General Officers and Substantive Colonels of the Territorial Army. The uniform for these officers will, in future, be the same as that approved for officers of similar rank in the Regular Army.

The silver aiguillette at present worn by officers of the Territorial Army holding appointments in the Royal Household as Aides-de-Camp, Honorary Physicians, or Honorary Surgeons, will be replaced by the gold aiguillette authorized for wear by officers of the Regular Army holding similar appointments.

60TH (CITY OF LONDON) ANTI-AIRCRAFT BRIGADE.—The new Headquarters of the 60th (City of London) Anti-Aircraft Brigade, Royal Artillery (T.A.) at Artillery House, Bromley Road, Catford, were officially opened by H.R.H. the Duke of Gloucester on Thursday, 17th February, 1938. This building is one of several new Territorial Drill Halls that are being erected around London to accommodate new Anti-Aircraft Units. Artillery House will be the first to be opened. Although designed to house modern equipment, the comfort of all ranks has been the first consideration. A spacious well-equipped Recreation Room, Squash Court, and Miniature Rifle Range are among the attractions offered.

SEARCHLIGHT UNITS.—The transference of responsibility for anti-aircraft and coast defence searchlights from the Royal Engineers to the Royal Artillery applies only to the Regular Army. The situation with regard to the Territorial Army is under review. In no case, however, will R.E. units of the Territorial Army be required to change over against their wishes.

INDIA

A notable step forward has been taken in the mechanization of the Army in India. For the first time, two Indian Cavalry Regiments, the 13th Duke of Connaught's Own Lancers and the Scinde Horse (14th Prince of Wales's Own Cavalry) are to be converted into armoured-car units. Students of coincidences will remark that the 11th Hussars and 12th Royal Lancers were the first British Cavalry units to be mechanized and that the sequence of priority of mechanization by regimental numbers now runs consecutively from eleven to fourteen. Two British Cavalry Regiments, the 3rd Carabiniers and 17th/21st Lancers, stationed at Sialkot and Meerut respectively, have had all their horses withdrawn and are well on the way towards conversion to light tanks.

FOREIGN

CZECHOSLOVAKIA

President Benesh has made an important declaration of policy on the attitude of Czechoslovakia in the event of aggression. While emphasizing that he regards improvement of relations with Germany as vital, he repudiates the right of any foreign power to interfere in the internal affairs of his country. " We do not believe war to be imminent," he affirmed, " but we are prepared to defend our democratic ideals and territorial integrity, if necessary by force. Our military strength and industrial resources are second only to those of the Great Powers."

The Presidents' declaration has been underlined in an announcement issued by General Krejci—Chief of the General Staff. The defence services he said, must be prepared to meet a sudden attack from the air, supported by the action of high-speed mechanized units.

The country must reckon on having to stand alone in the critical first stage of an attack and, for reasons of time and space, would have to mobilize without the active help of her Allies. To this end, her " Maginot line " of fortresses had been erected and were nearing completion. These defences would afford time for military and industrial mobilization, would shield the vitals of the country from a knock-out

blow, and would form a screen behind which the defence forces would retain liberty of manœuvre.

General Krejci further announced that certain departments of the Skoda munitions works in Pilsen were being transferred to less vulnerable places. Eight large aircraft factories were in full production. Czechoslovakia, therefore, has strained every nerve to develop her defensive strength against any sudden act of aggression.

GERMANY

In connection with the plans for strengthening the German Army, outlined by Herr Hitler in his recent Reichstag speech, measures have been announced relative to the reinforcement of the Corps of Officers in the event of war. Under a decree issued on 1st March, 1938, by General Keitel, every able-bodied German, regardless of age, who has at any time held a commission as an officer in the fighting forces, is made liable to military service. The decree affects all Regular Officers from the old Imperial Army, from the former Reichswehr, or from the new Army, whether now or in future retired or discharged from active service.

General Keitel—the new Chief of the Supreme Command of the armed forces, is 55, and served as an artillery commander in the Great War. Before his recent promotion, he controlled the Personnel Section, in the War Ministry, at Berlin.

Ten Lieutenant-Generals have been promoted by Herr Hitler to General in connection with the Army reorganization announced on 4th February, 1938. These include new Commanders for the 4th, 8th, 12th and 14th Army Corps, and a new Inspector of Cavalry—General von Gossner. The 14th Army Corps is a new formation, and the appointment of its Commander was the first official disclosure of its existence.

Horses for Army purposes are being bought in large numbers by the German Government, particularly in Norway, where supplies of hardy mountain ponies, suitable for pack transport, abound. Pack animals would certainly be required in the Bavarian Alps, both for artillery and transport. Winter conditions on Germany's eastern frontier, also, might render the use of mechanical transport quite impracticable. For these, and other reasons, the new German Army—with the notable exception of three Armoured Divisions—has been created mainly on a horsed basis. Germany is favourably situated in respect of her supply of horses, and the last census showed a total of 3,450,000 as compared with 1,100,000 in the United Kingdom. Long columns of slow-moving horsed transport, however, offer an ideal target for enemy air action.

AIR NOTES

ROYAL AIR FORCE

AIR ESTIMATES

Lieutenant-Colonel Muirhead, Under-Secretary of State for Air, introducing the Air Estimates in the House of Commons on 15th March, said that the estimated expenditure during this year amounted to £103,500,000, which included £30,000,000 from the Defence Loan. This sum is nearly six times as large as in 1934; twice as large as in 1936—a full year in the expansion period—and showed an increase of 25 per cent. on the amount for the past year. The Under-Secretary of State went on to say that the general national situation was under a fresh review by the Government, and, in the event of an acceleration or extension of the present Air Force programme, any further expenditure which might be necessitated would appear in the form of Supplementary Estimates.

PERSONNEL.—Between April, 1935, and March, 1938, 4,500 pilots and 40,000 airmen and boys entered the Royal Air Force, giving a yearly average of 1,500 pilots and 13,000 airmen, compared with a typical pre-expansion year of 300 pilots and 1,600 airmen. The Cranwell programme for this year allows for 75 entrants, against 56 in an average pre-expansion year, but the former figure includes a number of aircraft apprentices and of Dominions candidates. As mentioned below in these Notes, the requirements under the short-service programme were filled by January. The Dominions have made an invaluable contribution to Air Force requirements in pilots, and some 430 Dominion candidates have joined during the last two years. Selection and medical boards have now been established in Canada, Australia, New Zealand, Southern Rhodesia and Nairobi.

As regards airmen, this year's programme calls for 17,000, compared with 14,700 in 1937, and includes an increase in apprentices and boys and entrants for the fitter group. In spite of the big demand which has been made in the field of eligible candidates, the standard of education and personality has so far been maintained for both officers and airmen. The age of boy entrants during this year has been reduced from 15 years and 9 months to 15 years. In view of the need for skilled men, another depot, similar to that at Halton, is being established at Cosford.

EQUIPMENT.—The Metropolitan Air Force at present contained 123 squadrons. There were 26 squadrons oversea, and in addition the Fleet Air Arm represented an equivalent of 20 squadrons, giving a total of the equivalent of 169 squadrons. As regards numbers of aircraft in the Metropolitan Air Force, the expansion programme aimed at 1,500 first line aircraft for March, 1937, and reached shortly afterwards, and approximately 1,750 by March, 1939, coupled with rearming with up-to-date types.

In the regular industry and in the shadow scheme, engines were somewhat ahead of air-frames, but the air-frame situation itself was encouraging. There was now no margin between the situation of aircraft supply, compared with those of instruments and armaments. Blind flying instruments were being fitted to all types now being produced but not to obsolescent types, which were not being used

for flying in conditions of cloud or bad visibility. Gun supply was satisfactory, and the system of operating some of the guns was a notable step in armament progress. Owing to the greatly increased speeds of aircraft, men could no longer expose themselves, nor had they the necessary strength to turn the guns by hand against the rush of air. Power-operated revolving turrets, enclosing man and gun, had therefore been installed. All turrets had been designed and were being made in this country, and the flow of production was now satisfactory.

Lieutenant-Colonel Muirhead then went on to say that relative strengths were not a mere matter of counting what were apparently complete aircraft, and there was every reason to believe that, on a conservative basis, we were as good as any other country, and probably better in that matter.

The whole programme of production from the outset demanded speed, and did so still. In the early days of expansion the policy was necessarily adopted of placing a production order for several types of aircraft straight from the drawing-board. There was now a possibility that, with the fuller development of the aircraft industry on a broader basis, and with good machines now in production, they would again adopt a system of prototypes; but an improved system which, it was hoped, would combine efficiency of type with speed of production. With the speed at which scientific and technical development was taking place, the problem must be to keep the balance between speed of production on the one hand, and being up to date on the other.

Developments and improvements in aircraft had been so big and rapid and of such a fundamental character that new types now being turned out were actually, and not nominally, new types. Comparing the performance of some representative operational types at the end of the War, in 1932, and to-day, the Martynside, during the War, had a top speed of 114 miles an hour, and the Fury, in 1932, 206 miles an hour, compared with the Hurricane of to-day, which had a speed well known and an increased rate of climb. (In February, a Hawker Hurricane was flown from Turnhouse aerodrome, Edinburgh to Northolt, at an average speed of 408.75 miles an hour almost entirely by instruments; there was a very strong wind of over 50 miles an hour, but it was not directly aft.) Among the medium bombers, the D.H.10 had a top speed of 117 miles an hour at the end of the War; the Sidestrand, in 1932, was little better; the Blenheim to-day had a top speed of 280 miles an hour.

The great speed of aircraft now meant that the moment of effective contact between two opposing aircraft would tend to be more fleeting than before. An increased rate of fire for machine guns to take advantage of these moments was essential. To meet this increasing importance of armament and its progressive nature, armament development at the Air Ministry had been placed under a separate Director.

TRAINING.—The expansion programme has necessarily involved a great expansion of training facilities. In the vital matter of training of pilots, not only have these extended facilities enabled the full requirements of pilots for the programme to be met, but they have also been organized in such a way as to result in a general raising of the standard of training. This result has been achieved by a new system of training, under which pupils are instructed in elementary flying at civil schools before being posted to the Service flying training schools. In consequence, it has been possible widely to extend the scope of instruction at the Service schools, and it is the general opinion of the responsible officers that the young pilots leaving the schools, who now receive an average of 150 hours flying experience before joining their squadrons, are better trained than ever before. Squadrons are relieved of the

individual training which previously fell to them, and are enabled to concentrate on operational training at an earlier stage.

Moreover, there have been drastic changes of both operational practice and training methods as a result of developments in the use of wireless and flying instruments. Before expansion started, a course of instrument flying had been introduced at the Central Flying School, and as qualified instrument flying instructors have become available, instrument flying has been introduced in the syllabus at flying training schools. All dual control service aircraft at such establishments have now been fitted with hoods for blind flying practice, and in order to maintain the efficiency of qualified pilots in this form of flying, dual control aircraft fitted with hoods are available in all Service squadrons.

The Royal Air Force was the first Air Service to make large-scale use of the Link trainer, a device which enables all the operations of instrument flying to be taught and practised on the ground under realistic conditions. A new standardized panel of all the instruments required for blind flying has also been introduced and is being fitted in all the latest types of aircraft.

A large increase has been effected in directional wireless and meteorological facilities. Apart from civil stations, 35 meteorological and 19 direction finding stations are now available, compared with 21 meteorological and 6 direction finding stations in 1935, and 31 additional meteorological stations and 11 additional directional finding stations are now in course of construction.

The provision of adequate facilities for armament training has resulted in the increase of Armament Training Camps from three in 1934 to seven, and four others are in course of preparation. Armament training has been introduced into the syllabus of flying training schools, and, in addition, the pilots and crews of all squadrons are required to go through a course annually.

Appointments

The following appointments have taken effect on the dates shown :—

Air Vice-Marshal.—P. H. L. Playfair, C.B., C.V.O., M.C., to Headquarters, No. 1 (Bomber) Group, Abingdon, as Air Officer Commanding, to date 24th February; W. Sholto Douglas, M.C., D.F.C., to Air Ministry, as Assistant Chief of the Air Staff, to date 17th February; D. C. S. Evill, D.S.C., A.F.C., to Headquarters, Bomber Command, Uxbridge, as Air Officer in Charge of Administration, to date 28th March.

Air Commodores.—F. G. D. Hards, D.S.C., D.F.C., to Headquarters, Coastal Command, Lee-on-the-Solent, as Air Officer in charge of Administration, to date 24th January; R. P. Willcock, to Air Ministry, as Director of Staff Duties, to date 17th February; A. A. B. Thomson, M.C., A.F.C., to Headquarters, No. 3 (Bomber) Group, Mildenhall, as Air Officer Commanding, to date 17th February; S. W. Smith, O.B.E., to Headquarters, Bomber Command, Uxbridge, as Senior Air Staff Officer, to date 7th March.

Group Captains.—M. Henderson, C.I.E., D.S.O., to Headquarters, Training Command, Market Drayton, as Senior Equipment Staff Officer, to date 15th January; K. R. Park, M.C., D.F.C., to R.A.F. Station, Tangmere, in command, to date 3rd January; R. D. Oxland, O.B.E., to No. 1 R.A.F. Depot, Uxbridge, for course at the Imperial Defence College, to date 18th January; G. B. Dacre, D.S.O., to R.A.F. Station, Thorney Island, in command, to date 3rd February; J. H. Herring, D.S.O., M.C., to R.A.F. Station, Stradishall, in command, to date 3rd February;

R. H. M. S. Saundby, M.C., D.F.C., A.F.C., to Air Ministry, as Deputy Director of Operational Requirements, to date 18th January; C. C. Darley, C.B.E., A.M., to No. 1 (Indian) Group Headquarters, Peshawar, in command, to date 8th January; A. Lees, D.S.O., A.F.C., to R.A.F. Station, Driffield, in command, to date 7th February; R. S. Maxwell, M.C., D.F.C., A.F.C., to R.A.F. Station, Dhibban, Iraq, in command, to date 2nd February; A. S. Morris, O.B.E., to Aircraft Depot, Dhibban, Iraq, in command, to date 10th February; G. W. Murlis-Green, D.S.O., M.C., to R.A.F. Station, Cardington, in command, to date 14th February; M. Henderson, C.I.E., D.S.O., to Headquarters, Training Command, Market Drayton, as Officer-in-Charge, Administration, to date 1st February; W. B. Farrington, D.S.O., to Headquarters, Training Command, Market Drayton, for Equipment (Engineer) Staff Duties, to date 1st February; N. H. Bottomley, C.I.E., D.S.O., A.F.C., to Headquarters, Bomber Command, Uxbridge, for Air Staff Duties, to date 21st February; E. L. Howard-Williams, M.C., to Headquarters, Fighter Command, Stanmore, for Equipment (Engineer) Duties, to date 19th February; D. F. Stevenson, D.S.O., O.B.E., M.C., to Air Ministry, as Deputy Director of Operations (Home), to date 7th March; A. H. Jackson to Air Ministry, to date 1st February; P. Huskinson, M.C., as R.A.F. Member of Ordnance Committee, Royal Arsenal, to date 14th March; A. W. Milne to R.A.F. Station, Leconfield, in command, to date 14th March; Wing Commander (Acting Group Captain) W. E. Bryant, M.B.E., as Air Attaché, Tokyo, to date 9th February.

Royal Air Force Expansion

The following is a summary of the progress made under the expansion of the Royal Air Force since the decision to expand was announced in May, 1935:—

(*a*) *New Stations.*—Thirty new stations and armament training camps have been opened, and a further twenty-one sites have been selected.

(*b*) *Recruiting.*—Since 1st April, 1935, approximately 4,500 pilots have been selected for the Royal Air Force. The number of airmen entered from the same date totals 30,700. In addition approximately 6,300 boys are undergoing training at Halton and Cranwell as aircraft apprentices, and 2,150 as boy entrants elsewhere.

The total strength of the force is now approximately 67,400.

The works programme provides for the construction of additional Air Force stations and maintenance units distributed throughout England and Scotland at a total cost in the coming financial year of nearly £11,000,000 They will be used principally for Defence Training Establishments and maintenance purposes required under the extended expansion scheme.

The new stations will, in addition to the aerodromes, provide for the accommodation of officers and men and for the housing of aircraft, as well as the usual recreational and other ancillary establishments; the largest hangars will be capable of accommodating complete squadrons of aircraft.

The selection of sites is, in varying degrees, governed by strategic and other Service considerations; within the limitations thus imposed, it has been the policy to take into account the many and varied considerations affecting the life of the community both local and national. In order to ensure that, in pursuance of this policy, the best possible advice is readily available, Professor L. P. Abercrombie, M.A., F.R.I.B.A., has been appointed to act as Consultant in connection with the acquisition of sites. Professor Abercrombie is Professor of Town Planning, Bartlett School of Architecture, University College, London, and is Consultant Architect to the Department of Health for Scotland.

Organization

New Formations.—The following were formed, or will form, on the dates shown :—

R.A.F. Station, Shawbury, on 13th April, and placed in the Training Command in No. 23 (Training) Group.

Station Headquarters, Nairobi, on 1st March.

No. 22 Elementary and Reserve Flying Training School, at Cambridge, on 1st February, and placed in the Training Command in No. 26 (Training) Group.

No. 23 Elementary and Reserve Flying Training School, at Rochester, on 1st April, and placed in the Training Command in No. 26 (Training) Group.

Transfers.—No. 53 (A.C.) Squadron, from South Farnborough to Odiham, on 9th April.

No. 23 (Fighter) Squadron, from Northolt to Wittering, on 18th May, and transferred to No. 12 (Fighter) Group.

No. 64 (Fighter) Squadron, from Martlesham to Church Fenton, on 18th May.

No. 213 (Fighter) Squadron, from Church Fenton to Wittering, on 18th May.

No. 104 (Bomber) Squadron, from Hucknall to Bassingbourn, on 2nd May.

No. 108 (Bomber) Squadron, from Cranfield to Bassingbourn, on 2nd May, and transferred to No. 2 (Bomber) Group.

New Titles.—The name of No. 2 Air Armament School, North Coates, was changed to No. 1 Air Observers School on 1st March.

No. 33 (Bomber) Squadron, now temporarily stationed in the Middle East, was renamed No. 33 (Fighter) Squadron on 1st March.

" Emergency Service."—The Air Council has officially recognized " Emergency Service " as a voluntary organization, the purpose of which is to train women as officers for any women's corps that may be employed on duties, other than nursing, in a national emergency. The organization will be available for service when required in any national emergency, and, in the event of a Women's Reserve being organized, would be absorbed into that Reserve either as a unit or as individual members.

Personnel

Although the number of pilots required during the past year, which ended on March 31st, reached the record figure of 1,750, the whole of that number had been obtained by the end of January. Of the total, approximately 1,300 were accepted from candidates from civil life and the balance, in accordance with normal policy, selected volunteers from serving airmen in the Royal Air Force.

Attachment of Foreign Officer.—Flying Lieutenant Angel R. Vaccari was attached to No. 1 F.T.S., Leuchars, from 10th February to 12th March.

Attachments for Specialist Course.—The following Officers completed the specialist armament course at No. 1 Air Armament School, Eastchurch, which terminated on 18th December, 1937: Captain M. Sheerin, Eire Air Force; Lieutenant T. R. Theron, South African Air Force; Lieutenant Hassan Mahmoud, Egyptian Army Air Force; Lieutenant Raouf Hassan, Royal Iraqi Air Force.

General

Empire Air Day.—Empire Air Day will be celebrated this year on Saturday, 28th May, when the majority of the stations in the home commands will be opened

to the public under arrangements similar to those which have been made in past years. The names of the stations to be opened, together with further particulars, will be announced in due course.

OVERSEAS COMMANDS

Flights

Iraq and India to Singapore.—Aircraft of No. 70 (B.T.), No. 84 (B) and No. 203 (G.R.) Squadrons from Iraq and aircraft of No. 39 (B) and 60 (B) Squadrons from India, flew to Singapore during January in order to take part in a combined operations exercise and returned to their home commands during February.

ADEN

Al Haidara Mansur Unrest.—Since the disturbance in August, 1936, the situation in the Mansuri territory had been regarded as settled. The fines imposed on the culprits were paid, a written undertaking was obtained from the headmen of all sections to observe the authority of the Fadhli Sultan and a small post of the Sultan's soldiers was left in Dirjaj to ensure the maintenance of peace. On return of the Air Staff Intelligence Officer to the Fadhli country on the 8th December, however, he discovered that the Sultan had unwisely withdrawn his post from Dirjaj and that the Al Mansuri, interpreting this as a sign of weakness, and encouraged by the Lower Yafai Sultan, were once more adopting an attitude of open defiance and the Sultan was refused entry to the village.

An ultimatum was issued to the Mansur tribe on the 14th December informing them that if peaceful installation of the post at Dirjaj was opposed, force would be used, and on the 16th December final notices of the intention to take air action were dropped by air. Bombing was carried out against Dirjaj and Sheiloub Fort on the afternoon of the 16th, following which the Fadhli tribal guards advanced and made an attempt, which proved unsuccessful, to enter the village. To avoid casualties they were withdrawn and air action was resumed next day. A sustained air attack had its effect on the culprits and the village of Dirjaj and Sheiloub Fort were occupied by Fadhli troops without further opposition.

No casualties were reported as the result of air action, although a few were sustained by tribesmen on either side during the ground encounter on the 16th.

Following the submission of the Al Haidara Mansur, a meeting took place in Aden between the Lower Yafai and Fadhli Sultans and a two years' truce was signed which should result in a greatly improved state of affairs in Abyan.

Hadhramaut Unrest.—On the 12th January, R.A.F. aircraft proceeded to Seiyun, in the Wadi Hadhramaut, to deal with two areas of unrest which appeared likely to develop into more serious trouble.

The first involved the Tamimi tribe who live close to Tarim and who had been disturbing the peace by interfering with the property of residents in Tarim. In this case the presence of aircraft enabled the political authorities to achieve a satisfactory settlement of the situation without the necessity for the employment of air action.

A second area of unrest involved the notorious Sei'ar tribe who live in the inaccessible country North of the Wadi Hadhramaut and whose raiding proclivities have been a constant source of trouble in the past. Protracted political negotiations produced no satisfactory result and air action proved to be necessary. One bomb-

ing raid by three aircraft on 20th January, however, produced the desired result. The dar of the chief offender was completely demolished in a most spectacular fashion in full view of a number of Sei'aris who were duly impressed and subsequently submitted to Government, giving a guarantee of future good behaviour. Following the submission of the Sei'aris, the fort at Husn Al Abr, 100 miles North-West of Seiyun, and an important point at the junction of a number of routes into the Hadhramaut was occupied by Q'aiti local forces. At the time the fort was in the hands of Aei'ari raiders who had with them a number of looted camels. Messages were dropped on the fort informing them that air action would be taken if opposition were offered to the occupation of the fort by Q'aiti troops. Having heard that air action had been taken earlier against other Sei'aris, the raiders submitted quietly and handed over the looted camels.

INDIA

WAZIRISTAN SITUATION.—Although the general situation in Waziristan continued to be somewhat unstable, steady progress was made during the period under review towards a return to normal conditions. Whilst no organized opposition to land forces occurred, the usual crop of petty hostile acts continued unabated. The Fakir of Ipi remained in Madda Khel limits and intensified his campaign of propaganda. The Madda Khel tribe as a whole appeared to be unwilling either to eject or to control the Fakir.

On the 3rd December a demonstration was carried out by three squadrons of aircraft over Shabi Khel country and notices were dropped on the tribe ordering them to attend a jirga at Tank. These orders were duly complied with, and the jirga was reported successful.

During the night of the 16th/17th January a mixed gang of Wazirs and Afghans fired on a scouts post at Spinwam. On the following morning, aircraft reconnoitred the area and reported that the Mir Ali-Spinwam road was blocked. Two aircraft, who retaliated with bombs and machine-gun fire, were fired on by the gangs. On the 18th January a strong mobile column of the 3rd Indian Infantry Brigade and ancillary troops were despatched to the area and encountered heavy opposition from some 120 tribesmen. During the ensuing engagement aircraft carried out tactical reconnaissances and were able to take effective action in close support of the ground forces against several bodies of the enemy.

The lines of communication in South Waziristan having been re-opened, the employment of aircraft on transport duties to Wana was discontinued. The last journeys were made on the 1st December, when 53 personnel and 6,028 lbs. of supplies and kit were carried. During the period April to December, 1937, a total of over 260 tons of supplies and 4,400 personnel, including over 100 sick and wounded were transported by aircraft in South Waziristan.

PALESTINE

Armed gang activity persisted in Palestine throughout December. Extensive operations were undertaken by ground force to locate and destroy the armed gangs, to restore confidence in the ability of the Government, to protect villages whose inhabitants were prepared to co-operate, and to punish offenders. These operations culminated in two major encounters with armed bands. The first of these was at Arraba on the 23rd December when aircraft came to the timely assistance of a detachment of Trans-Jordan Frontier Force which had encountered an armed band numbering approximately 200 strong, which was making a determined attempt

to cut off their retreat. An emergency call for air support was sent out at a time when the situation was decidedly critical and aircraft immediately answered, attacking the gangs until dusk and pinning the enemy down and compelling them to take cover.

As a result of the encounter at Arraba the remaining members of the band split up and dispersed to the Wadis and caves in the Gallilee district. Detachments of Army troops commenced a drive on the 25th December to clear the Wadis and their tributaries. Covering support was given by aircraft and was undoubtedly of the greatest assistance to the troops. Active opposition on the part of the enemy ceased on the appearance of aircraft overhead and the enemy were forced to take cover.

Convoys of the Palestine Potash Company continued to be escorted by armed aircraft during the month.

FAR EAST

During the month of November, twelve aircraft of No. 100 (Torpedo Bomber) Squadron carried out a successful long range cross-country flight to Akyab and return, a distance of over 3,000 miles in all.

FOREIGN

DANZIG

It has been reported in the Polish press that the Free City of Danzig has decided, at a special meeting of the newly-formed Danzig Air Defence League, to organize its own air force. No further particulars have yet been divulged.

FRANCE

North Atlantic Air Line.—Arrangements have been made by M. Pierre Cot, the former French Air Minister, for the immediate fitting up of two hangars in a sheltered creek on the Biscarosse (Landes) Broads, in which to house the flying boats Latecoere 521 ("Lieutenant de Vaisseau Paris") and the Latecoere 522, which are to be used for trial flights over the North Atlantic.

A sum of 40 million frs. (£322,000 at par) has been earmarked for this purpose, of which 15 million to 20 million frs. will be devoted to the construction of the two hangars, about a kilometre of new roadway, and a wireless installation. On the completion of this work, it is intended to build a much larger hangar to house the new heavier type C.A.M.S. 161 and L.E.O. 49, in addition to the Latecoere flying boats.

It has been pointed out that the recent South American flight (by the "Lieutenant de Vaisseau Paris") has proved that this type has a range sufficient to cross the Atlantic without landing at the Azores, the use of which is not permitted by the Portuguese Government. The station Saint-Pierre et Miquelon could be used as an alternative.

A new flying boat, the Latecoere 631, has been constructed for Air France to be used on their trans-atlantic routes. This aircraft is fitted with six Gnome Rhone P.18 engines arranged along the wing-leading edge. It has an estimated maximum speed of 260 m.p.h. and a cruising speed of 217 m.p.h. On the North Atlantic route, with twenty passengers, a crew of eight and 6,610 lbs. of freight, the range is

3,700 miles, while on the South Atlantic route the range is 2,000 miles, with forty passengers and 23,320 lbs. of freight.

It is reported that the Air Ministry will order six flying boats for the North Atlantic route, and in addition to the Latecoere 631 the C.A.M.S. 161 and the L.E.O. 49 are also under consideration.

AVIATION RECORDS.—On 7th February, 1938, the French pilot Rossi, flying an Amiot 370 from Oran, set up new speed records over 2,000 kms. (1,242 miles) with a load of 2,000 kgs., at an average speed of 437 km./h. (271 m.p.h.). This flight also set up new records over this distance " without load," with 500 kgs. and 1,000 kgs. The previous records set up by Italy in December, 1937, were thus beaten.

It was intended to enter the Amiot 370 in the Istres–Damascus–Paris race which took place in August, 1937, but the aircraft was not ready in time.

L'ARMÉE DE L'AIR ET AEROSTATION.—The lighter-than-air section of *l'Armée de l'Air* has a central depot and research station at Chalais Meudon, and a school of aerostation at Versailles. There are three demi-brigades, each of two battalions; the battalion has two companies, the company being the unit.

The 51st Demi-Brigade is divided between Metz and Épinal, the 52nd is at Compiègne, and the 53rd at Toulouse. At Metz, Compiègne and Toulouse there is also a balloon " park " where the stores for mobilization are kept and repairs are carried out.

The aircraft consist of Zodiac moto-balloons and barrage balloons. The latest type of moto-balloon, the MBZ3, is a small airship of 35,000 cubic feet and has a maximum speed of 45 m.p.h., power being supplied by a 60 h.p. Salmson engine. The balloon is manned by a crew of two and can remain in flight up to three hours; it normally flies very low, but has a ceiling of some 2000 feet. It can be converted into a kite balloon in less than ten minutes, and as such has a ceiling of about 4000 feet.

The moto-balloon goes far towards solving the problem of mobility, as it can keep pace with the mechanized army of to-day.

GERMANY

AVIATION RECORDS, 1937.—The Heinkel aircraft which beat the speed records over 1,000 km. with 1,000 kgs. useful loads on 22nd November, 1937, has been identified as a Heinkel Type 606. This is probably a special version of the He. 111 bomber.

ITALY

VISIT OF THE ROUMANIAN AIR MINISTER TO ITALY.—His Excellency Radu Irimescu, Roumanian Minister for Marine and Air, arrived in Rome on an official visit in November. He called on General Valle, the Under-Secretary of State for Air, at the Italian Air Ministry and was shown round the Air Ministry Departments, after which he visited the School of Aerial Warfare. In the evening he was the guest of honour at a dinner given by General Valle at the Italian Air Force Club.

Subsequently, Mr. Irimescu paid a visit to the aerodrome at Ciampino (Rome) and saw some air exercises, after which he proceeded to the experimental and research centre at Guidono. Some days were spent by Mr. Irimescu in paying visits to various aeronautical factories.

It is said that one of the reasons for Mr. Irimescu's visit to Italy was that the performance of the Savoia 79B twin-engined bombers, supplied by Italy to the

Roumanian Government, had been found to be unsatisfactory. It is also stated that every effort was made to unload a definite contract for further supplies upon the Roumanian Air Minister during his visit, but that the latter had refused to commit himself.

EXPLOSION AT THE CHEMICAL FACTORY AT SEGNI.—The explosion that took place at the explosive factory at Segni on 29th January is reported to have been much more severe than official reports would indicate. Practically nothing was allowed to appear in the Italian press, and only a very short statement, with a ridiculously small estimate of casualties, was published.

It is reliably reported that at least 100 persons were killed and 800–1,000 injured. There is said to be much feeling amongst the general public who know the true facts at the attempts being made to hush up the affair and to pass it off as a minor catastrophe.

Although there is no reason to believe that this explosion was caused by sabotage, cases of sabotage have been reported elsewhere in Italy, and in one case recently it was stated that some twenty aero engines were found to be unfit for use owing to what appeared to be deliberate faulty construction in the Fiat engine works in Turin.

SPECIAL FLIGHTS.—According to the official Italian communiques the following records were carried out in November and December :—

On 28th December Cant Z.506.B seaplane fitted with three Alfa Romeo 126 R.D. 34 type engines of 750 h.p. each took off from Cadiz for Latin America and landed at Caravellas in Brazil having covered a distance of 4,350 miles at an average speed of 154 miles per hour, thereby gaining an international record for a non-stop flight by seaplane. The flight was carried out at an altitude of 11,500 feet to 13,100 feet.

On 24th January a formation of three Italian aeroplanes left the airport of Guidonia, near Rome, on a flight in three stages to Brazil, and landed at Dakar (Senegal). During this first stage they were stated to have covered about 2,800 miles at an average speed of 260 m.p.h., and to have maintained a height of between 13,000 feet and 16,000 feet. Lieutenant Bruno Mussolini, the second son of the Duce, piloted one of the aircraft, the other pilots being Colonel Biseo and Captain Moseatelli. Each aircraft carried a second pilot and a crew of three. The whole flight covered about 6,250 miles, the longest stage being that to Dakar, which took the airmen over a new short route across the Sahara never before attempted in a flight to South America.

The second stage from Dakar to Brazil proved to be the final stage for two of the aircraft, the pre-arranged break at Port Natal being ignored, the third developing engine trouble and landing on arrival at Port Natal. The distance of this second stage is 3,312 miles, and it is claimed that this was flown at an average speed of 245.5 m.p.h. Meteorological conditions at this time of year normally include a 15 to 25 miles per hour favourable wind for the flight, but the actual weather conditions encountered are not known.

For the purpose of the take-off a special concrete runway was used, 1,200 yards in length, 100 yards of which were inclined. 1,650 gallons of petrol is said to have been carried.

The aircraft employed on this flight was the Savoia 79 with three Alfa Romeo engines of 750 horse-power each; these engines are of Bristol Pegasus design constructed by Alfa Romeo under licence. The aircraft, which has a retractable undercarriage, was not fitted with gun turrets, and was similar to the type used in

the Paris–Damascus race with the exception that extra petrol tanks were fitted. In the Paris–Damascus race three aircraft of this type averaged about 214 miles per hour over the whole distance.

The Savoia 79 and the Fiat BR.20 are the main re-equipment types in the Italian Air Force, and they are already in service in several squadrons.

NORWAY

AIR DEFENCE FORCES.—The Norwegian press publishes the following extracts from the report of the Parliamentary Committee on the reorganization of the Air Defence Forces :—

(i) The Committee are against the establishment of a combined air force. They are of the opinion that the navy should have its own unit, under its own organization as part of the naval defence force.

(ii) The Committee advises energetic action in the formation of a technical organization for co-operation in the purchase, manufacture and maintenance of aircraft engines, guns, wireless, etc. ; in flying training schools, and in all branches of the fighting services during joint air manœuvres.

(iii) The following air units will come under the control of the Inspector-General of Flying.

(*a*) Ground Air Defence (A.A. Artillery).

(*b*) Non-combatant air defence (air reports, black-outs, etc.).

(*c*) The Army, Air Force, and all other air units.

MILITARY AIR STATION.—It is reported that work on the construction of an airport at Skattora, near Tromso, has been in progress for some time. The present proposal is that three seaplanes will be stationed there.

UNIFICATION OF AIR FORCES.—The Military Committee of the Storting met during November to discuss the plan for unification of the country's air forces put forward by the Chief of the General Staff. The General Commanding approved of the plan ; the Admiral Commanding, however, disapproved, on grounds which have become familiar from their constant repetition in all countries where the same question has arisen, and which amount to the proposition that "all units which operate on the naval front must be under a common naval command." No agreement appears to have been reached.

SOVIET UNION

ACCIDENT TO AN AIRSHIP.—According to the Press, the dirigible V-6 was destroyed on 5th February in an accident which occurred in the neighbourhood of Murmansk. The airship was making a flight from Moscow to Murmansk to test its suitability to take part in the operations for the rescue of the polar scientists, and while flying in conditions of bad visibility, crashed into the side of a hill.

The V-6 was a four-engined semi-rigid dirigible of 671,000 cubic feet capacity, and was the most modern unit of the Soviet airship fleet. In 1937 the same airship established what was claimed to be a record duration flight of 169 hours.

In the spring it was proposed to inaugurate, with the V-6 and V-8, a passenger and freight line between Moscow–Sverdlovsk and Moscow–Leningrad. Work has already started on the erection of short mooring masts and radio stations at the three airship bases. It is not known whether, as a result of this accident, the project will still go forward or be cancelled.

GLENN MARTIN FLYING BOAT.—The flying boat Martin 156, which was built at the Glenn Martin Works in Baltimore to the order of the Government of the Soviet Union, has been flown to New York, whence it will be shipped to the U.S.S.R.

It is a monoplane of 157-foot span with stub floats, and is fitted with four Wright Cyclone engines. The all-up weight will be about 60,000 lbs. Its estimated performance is 190 m.p.h. top speed, and 160 m.p.h. cruising. At 2,400 miles the pay load is estimated at 10,000 lbs., and there is accommodation for forty passengers.

It is not yet known on what route, or for what purpose, the Soviet authorities intend employing this aircraft.

PERSONNEL.—Press reports indicate that Corps Commander Loktionov and Corps Commander Smishkevich have replaced Army Commander Alksnis and Corps Commander Khripin as Chief and Deputy Chief, respectively, of the U.S.S.R. Air Forces. Although no official pronouncement has been issued concerning the arrest or otherwise of the latter two officers, there are good reasons for believing that both were " liquidated " in connection with the recent purge undertaken by the political department of the Red Army.

Loktionov was at one time an air force pilot, but has since held Army commands, including that of the Kharkov Military District. Smishkevich, early in 1937, was reported to be commanding an air brigade in the White Russian Military District, and later in the year to be commanding all air force units in this District.

Little is known about the professional ability of these two officers, and doubtless both have been promoted to their present appointments in consideration of their political reliability which is, at the present time, the over-riding factor when selecting officers for appointments of responsibility.

SWEDEN

AIRCRAFT INDUSTRY.—The Swedish Press announces that Svenska Aeroplan A/B, one of the two firms included in the firm of A/B Forenade Flygverkstader, which is to have a monopoly of the domestic manufacture of aircraft for the Swedish Air Force, have nearly completed the construction of their new aeroplane and aero-engine factories at Trollhattan. It is stated also that the engine factory had evolved a completely new type of engine rated at 1,000 h.p., which would free Sweden from the necessity of building foreign designs under licence, but this statement cannot be confirmed. The other member of this combine, A/B Svenska Jarnvagsverkstaderna, of Linkoping, have just completed an order for twenty Harts and are now building the German Focke-Wulf " Stieglitz " trainer under licence. The Gotaverken ship-yard at Gothenburg have completed three Harts and now propose to build sports aeroplanes of their own design.

REVIEWS OF BOOKS

MILITARY

Transportation on the Western Front, 1914-1918. Compiled by Colonel A. M. Henniker, C.B.E., with an Introduction by Brigadier-General Sir James E. Edmonds, C.B., C.M.G. (History of the Great War based on official documents H.M. Stationery Office). 21s., including Maps.

"Warfare consists of Men, Munitions and Movement. We have got the men and munitions, but we seem to have forgotten the movement." These words were spoken by Sir Douglas Haig in the latter part of 1916. Home authorities and G.H.Q. alike had waged war for two years without appreciating the role of transportation in modern continental war. French organization had carried them through so far and Sir Eric Geddes' reorganization during the winter of 1916–17 served to buttress the French system against breaking; but it is doubtful whether even in 1918, British commanders, staffs and services really understood the principles of transportation.

The devotion of a volume of the Official History of the Great War to Transportation on the Western Front is, therefore, wise. The volume is open to criticism as regards arrangement and the sections dealing with strategic movement are inadequate. It is unfortunate also that considerations of economy have confined the maps to one colour. But the book is a mine of information: very little of all the material compressed by Colonel Henniker into 526 pages can be found elsewhere; and no other work in English so well amplifies the post-war Manual of Movement. The story falls into seven sections.

(i) *The French System.*—It was originally agreed that the entire railway service should be manned and controlled by the French and unity of control was fortunately never lost. The French system (pp. 3–15 and 113–115) deserves close study: it was based on two main principles—unity of control at G.H.Q., and flexibility in detail ensured by intimate liaison between the military officers of the railway directorate and the responsible technical officials.

(ii) *The War of Movement,* 1914.—The need for flexibility at once became apparent; during the initial concentration of the B.E.F., detrainment zones were altered; during the retreat, railheads could only be selected a few hours before supply trains were due. The nightmare conditions of this period are well described in Chapter II; but the account of the lateral move from the Aisne to the North (in Chapter V), when every hour was of value, is too summary.

(iii) *Stabilization and the Growth of Maintenance Traffic,* 1914–16.—From the first, maintenance traffic steadily outgrew all forecasts; but "throughout the first two years of the war the British transport arrangements were dominated by the idea that the war would soon revert to one of movement." The L. of C., the transportation organization and its methods all evolved, but in hand to mouth fashion, and an intolerable burden fell on the standard-guage railways. This phase culminated in the battle of the Somme (Chapter VIII and pp. 156–161). The Amiens bottle-neck (pp. 136–138) merits particular attention.

(iv) *The Geddes' Re-organization, Winter*, 1916–17.—By the end of 1916 the situation was becoming critical: congestion at the ports was delaying the discharge of ships, shortage of rolling stock was delaying railway traffic, and in forward areas the means of distribution were inadequate. The transportation system was therefore in no condition to cope with increasing quantities of ammunition, a shortage of petrol, or an advance, all of which were envisaged as impending.

The re-organization carried through by Sir Eric Geddes was based on recognition that from camps and factories at home to the front in France the various transport agencies constituted a chain no stronger than its weakest link. The re-organization therefore comprised changes in organization towards greater unity of control (Chapter XII); improved dock working under a separate directorate (Chapter XIV); much greater assistance to the French railways (pp. 216–219 and Chapter XV); the development of light railways and better road maintenance in forward areas (pp. 214–215). In addition it prepared for an advance through Belgium. All this involved the provision of personnel, plant and material previously denied to France, but which was now forthcoming.

(v) *Expansion keeping Pace with Demand*, 1917.—During 1917—a year of four offensives—the capacity of the docks, railways, light railways and roads rapidly increased, and by September the General Staff was viewing with disfavour the tendency of all services and departments to accumulate enormous reserves in France. Economy in sea transport and man power was now vital, while a new factor was the increasing interference from the air (pp. 313–326). In January, 1918, therefore, control of the transportation services was centralized more closely in the hands of G.H.Q.

(vi) *The German Offensive, March–July*, 1918.—Chapters XX and XXI are short measure for the real testing time of the transportation system. In 1917 the C.-in-C. had written "I look to the railways to do much more than supply the Army's needs. I feel confident that at a certain moment they will give us that mobility which will enable me to out-manœuvre the enemy." The attack on the Third and Fifth Armies in March, 1918, gave rise to the most intensive series of troop movements of the whole war, but they are not described in any detail. Pages 398–402 on new construction to obviate the Amiens bottle-neck—under shell fire from April—are, however, of the first importance; so are pages 428–432 on the supply of detached British forces.

(vii) *The British Advance, August-November*, 1918.—By August, 1918, the French railways (like the German) were nearing exhaustion: "permanent way, locomotives and rolling stocks were wearing out, the skilled railway personnel insufficient and tired, and the stocks of essential materials dangerously low." It is not surprising, therefore, that by November communications were falling far behind the advancing front. The Armistice solved many problems.

This outline will perhaps indicate the value of this book, not only to officers of the transportation and other services, but also to staff officers and all concerned with the higher direction of war. Conditions have changed much since 1918, but the Great War is our essential starting point for study—and thought.

Machine Guns: Their History and Tactical Employment (Being also a History of the Machine-gun Corps, 1916-1922). By Lieut.-Colonel G. S. Hutchinson, D.S.O., M.C. (MacMillan & Co.). 15s.

It is well that a history of the machine gun should have been written, for never has a weapon so racked the soul of man, and never has a weapon so altered the face

of war. Colonel Hutchison traces its origin from a contraption invented about 400 B.C. called the Polybolos, which projected a " succession of arrows supplied by a magazine or hopper," to the cognate modern weapons known to modern history, of which the most famous are the *Mitrailleuse*, Gatling, Nordenfeldt, Hotchkiss, Maxim, and Vickers.

The first real landmark in the story is the appearance of the *Mitrailleuse*. This was confidently expected to sweep all enemies from the field ; but, as it was never allowed to be seen even on the drill-ground prior to its employment in the war of 1870, its tactical handling was faulty to an absurd degree, and it entirely failed to fulfil expectations. The result was that for the next thirty years, machine guns were everywhere discredited. During that period, however, Hiram Maxim had patented his wonderful invention. The British Army had used it at Omdurman with appalling effect. But even that evidence of its efficacy failed to remove the impressions of Gravelotte. Not until the Russo-Japanese war was well advanced, was its potentiality recognized. Between 1905 and 1914, most Powers equipped their armies with it, the maximum proportion being about two guns per battalion of infantry or regiment of cavalry. It remained still, however, the Cinderella of weapons.

In our case, underestimation of its quality was largely due to its comparative failure in South Africa where we had to deal with a skilful and elusive enemy thinly scattered in a vast country and where we sacrificed a good weapon by using it in the front line of the attack—a target not to be missed. As a result, in the decade that followed, we were inclined to over-emphasize the value of individual rifle-fire at the expense of the " controlled bullet storm."

After dealing with early history, the author takes us to the Western Front and tells of the doings of his weapons on many of its battlefields. At the same time, he gives a clear description of its tactical and technical development. There were many failures ; but in the end, we succeeded (as we always do, if given time) in producing a first-class system of handling this magnificent weapon. The points he lays special stress upon are : that infantry and machine guns are separate, though complementary arms ; the need for distinguishing between the automatic *rifle* and the machine *gun* ; the importance of controlling machine-gun fire collectively in a definite system ; the need for distribution in depth ; the value of overhead fire ; the need, tactically, for freedom of action and initiative. He seems, however, to place too much emphasis on the offensive power of the machine gun. Immensely valuable as it is in attack in set-pieces and in a succession of set-pieces, the weakness of its offensive, as compared with its defensive power in open warfare presents one of the most thorny tactical problems of the day.

The book pays a fine tribute to the magnificent services of the Machine-gun Corps during the War ; but it is in places unnecessarily diffuse and it includes much matter that has appeared in other writings by the author. These minor defects apart, it is to be recommended.

English Pistols and Revolvers. By J. N. George. (Small Arms Technical Publishing Co., Onslow County, North Carolina). 17s. 6d.

In this work there is more interest for the practical soldier than appears from its title.

When Marlborough laid the foundations of the British redcoat's fame, his weapon was the Brown Bess that so often opened the ball on the arm of her grim grenadier. Private enterprise in the shape of the skilled craftsmen and the talented

designers of London and Birmingham, notably R. Brooke, as our author shows, made Brown Bess, the most efficient musket in Europe.

The tradition of the private English gunmaker was a very fine one, before the present canker of technical officialdom and state factories raised its ugly head. The astonished student will read how Prince Rupert, when in billets at Stafford on 13th September, 1642, not only hit the weathercock of St. Mary's Church with the first shot from one of his rifled pistols, but to show his uncle the King that this was not a fluke, repeated the exploit with his second pistol. A photograph of a contemporary rifled pistol made by Nicholson of London, appears opposite page 18. Ordnance "bumbledom" applied the brake to individualistic progress to such effect that not until two hundred and thirty-four years later did the British soldier receive a rifled pistol (illustrated on page 126). This, too, in the days when Colonels still owned their Regiments and Captains their companies.

No craftsmen stand higher in the estimation of the world than British arms makers, and none have deserved better of their country and as builders of the British Empire than Nock, Manton, Forsythe and Baker. As Mr. George shows, whilst inventors gave their life's work, the bureaucratic octopus sucked their blood and brains. In decade after decade the same cycle of stupid officialdom repeats itself. At every phase, the British inventor is rejected in the hope that his patents will lapse, so that some State factory official may sequester them. Then comes the usual threat of war and the country is forced to buy from abroad whilst the British soldier is outshot by his better armed opponents. So we have our disasters at New Orleans, Khurd Kabul, Maiwand, Majuba, Colenso and Festubert, whilst the taxpayer disburses his money, always too late, to the Berners, the Sniders, the Martinis, the Miniés, the Berthiers, the Hotchkiss, the Nordenfeldts, the Larsens from Brunswick, Holland, Switzerland, France and Scandinavia, the Gatlings, Gardners, Maxims, Lees, Lewises and Brownings from America, and finally for the Czech Z.G.B. With all the devastating force of moderation our author describes, without passion, how in the hundred years of British technical supremacy, from 1838 to 1938, we bought but two British small arms, the revolvers of Adams and Webley.

Chapter 12 is perhaps the most interesting to the military student showing, as it does, how our committeemen have deprived the British fighting man of every successive improvement in weapons. The book stops abruptly, with a terse reference to the roughly made, so-called "Enfield" of 1936. Here is full State control, and the end of progress. The author's silence on such modern small-arms matters as the ultra-bullet, the percussion grenade or the machine-pistol is almost deafening. Great Britain does not possess such new-fangled contraptions, suited only for foreigners, and the British officer must not be bothered to study them.

The illustrations are excellent, though perhaps the author might have acknowledged his debt here and there to previous authorities.

It is gratifying to find photographs of weapons from the Museum of the Institution.

Alarms and Excursions: Reminiscences of a Soldier. By Lieut.-General Sir Tom Bridges, K.C.B., K.C.M.G., D.S.O., LL.D. (Longmans Green & Co.). 12s. 6d.

Tom Bridges has figured prominently in recent history on three occasions. Firstly, in 1913, when a Major of the 4th Dragoon Guards, he was British Military Attaché in Brussels. To him fell the task of opening conversations on the subject of Anglo-Belgian military co-operation, in the event of the Germans dishonouring

their bond. In the course of these conversations he was asked what would Great Britain's attitude be if Germany invaded Belgium, and Belgium did not appeal for help. Continental leaders have often asked that question; although a few glances at the records of the past should teach them that England has always asserted her claim to a prescriptive right of defending the Low Countries against a strong aggressor—with or without an invitation; though the details of history may not repeat themselves, the motives of history remain constant: Major Bridges replied to that effect.

Four years later the invading Germans, having smashed the British Fifth Army, were within measurable distance of winning the duel on the Western Front. The situation could be saved only by man-power. Sufficiently plentiful reserves were to be found nowhere, except in the United States. There Major-General Bridges, with four healed wounds and one still open, was sent to encourage a speeding of the supply of men; for the American authorities, unable at that distance to appreciate the urgency of the military crisis in Europe, were preparing at their leisure for a grand offensive by a self-sufficient American army in June, 1919. The degree of success following this British emissary's persuasive powers is already well known.

It was on the third occasion that he became so well known to the man-in-the-street. The "toy-drum" episode at St. Quentin in 1914 was a piece of whimsical theatricalism nicely judged to appeal to the humour of Thomas Atkins, and bring him grinning to his tired feet for more endless miles of a disheartening retreat.

It might be said that the author of *Alarms and Excursions*, with his energetic and effective service of the State, his delight in living, and no crippling fear of dying, personifies the spirit of the British Army at its best. In dealing in these memoirs with the moral effect of the battle of the Somme, he quotes Major-General Sir G. D. Jeffreys: "Somehow or other, the men managed to keep up an extraordinary good spirit which was very different from that which is sometimes described in some, to my mind, very bad war books that have appeared." Officers of the like of Tom Bridges—whatever their rank at the time—know how to make the best use of that spirit.

If only as an antidote to the poison of the defeatist and grousers' school of war-writing, books of this class deserve a very wide public. General Bridges' reminiscences have the additional appeal that they record a multitude of first-hand experiences in five continents, told with an engaging verve; and shrewd summaries of many once urgent military and international occasions.

A Foreword by the facile pen of Mr. Winston Churchill pays a well-deserved tribute to the author's services both as fighting soldier and popular Governor of New South Wales.

NAVAL

History of the Bombay Army. By Sir Patrick Cadell, C.S.I., C.I.E., V.D. (Longmans, Green & Co.). 18s.

The armies of Bengal and Madras have long been well served in the matter of written histories; but the equal needs of Bombay have till now been neglected.

No accident or whim has been the cause of this neglect: it lies deep-rooted in geography. Bombay, lacking as it does wealthy hinterlands comparable to those of Bengal and Madras, remained for a lengthy period the Cinderella of the Presidencies. The exertions of its Army lay in the defensive field. Not often was there the value of a highly fertile captured province to add lustre to its purely military achievements.

But military virtue—the same as murder—will out! The Bombay Army can look back on a long and continuous stretch of unobtrusive willingness for duty second to none: it can reflect that snobberies of caste and idiosyncracies of diet, both so pathetically common in India, have seldom been allowed to interfere with its military efficiency; service overseas, also, has never frightened it in the way it has frightened other armed forces of Indians. (The Persian Gulf became almost its parade ground.) Even the withholding of its pay—the greatest bug-bear of any soldier anywhere—has done little to affect its loyalty. No names with the implication of "Vellore" and "Meerut" mar the pages of its chronicle.

The upshot is that the Bombay Army can take pride in having to-day seventeen battalions of infantry with lives of more than a hundred years behind them. The corresponding figure for the originally much larger Bengal Army is—excluding the non-Indian Gurkhas—nine; while the surviving infantry units of the Madras Army were so reorganized under Lord Kitchener as to lose all connection with their origin.

But it must not be supposed that Sir Patrick Cadell has confined himself to mere panegyric. Every page of his "History of the Bombay Army" bears the mark of the true historian's regard for evidence—and nothing but the evidence. His forty-six years' service in the Bombay Presidency has enabled him to tap the evidence at its sources. Many decades must pass before this result of his research becomes superceded as *the* authority on its subject.

Sir Patrick has shown himself so good an historian that he will not mind if one small omission is pointed out. In one of his appendices, he gives a list of Bombay Army units raised for the German War. This list is not complete. Among the omissions is the 2nd 154th Indian Infantry, formed early in 1918 from companies of the 102nd Grenadiers, 108th Infantry, 119th Infantry (The Mooltan Regiment), and 122nd Rajputana Infantry. Before being mustered out in 1921, it saw service in Mesopotamia, Palestine, Egypt, and Waziristan.

ADDITIONS TO THE LIBRARY

GENERAL

JAPAN OVER ASIA. By W. H. Chamberlin. 15s. 8vo. (Duckworth).

SURVEY OF INTERNATIONAL AFFAIRS, 1936. By A. J. Toynbee and V. M. Boulter. 38s. 8vo. (Oxford University Press).

RED EAGLE. By Dennis Wheatley. 12s. 6d. 8vo. (Hutchinson & Co.).

ALARMS AND EXCURSIONS—REMINISCENCES OF A SOLDIER. By Lieut.-General Sir Tom Bridges. 12s. 6d. 8vo. (Longmans, Green & Co.). Presented by the Publishers.

ENGLISH PISTOLS AND REVOLVERS. By J. N. George. 17s. 6d. Cr. 8vo. (Small-Arms Technical Publishing Co., U.S.A. English Agent, T. Bland & Sons, Ltd., 4/5 William IV Street, London, W.C.2). Presented by the Author.

IF WAR COMES. By R. E. Dupuy and G. F. Eliot. 12s. 6d. 8vo. (Macmillan Co.). Presented by the Publisher.

SPAIN OVER BRITAIN. By H. Blythe. 1s. 8vo. (Routledge).

SOUTH OF HITLER. By M. W. Fodor. 10s. 6d. 8vo. (George Allen & Unwin, Ltd.).

BRITISH HISTORY IN THE NINETEENTH CENTURY AND AFTER, 1782–1919, 2nd Edition. By G. M. Trevelyan. 12s. 6d. 8vo. (Longmans, Green & Co.).

THE STORY OF SECRET SERVICE. By R. W. Rowan. 15s. 8vo. (John Miles, Ltd.).

GERMANY'S FIRST BID FOR COLONIES, 1884–1885. A move in Bismarck's European Policy. By A. J. P. Taylor. 7s. 6d. 8vo. (Macmillan & Co.).

FAMINE IN ENGLAND. By Viscount Lymington. 7s. 6d. 8vo. (H. F. & G. Witherby, Ltd.). Presented by the Publisher.

THE GREY DIPLOMATISTS. By Lieut.-Commander K. Edwards, R.N. 15s. 8vo. (Rich & Cowan). Presented by the Publishers.

NAVAL

A SHORT HISTORY OF NAVAL AND MARINE ENGINEERING. By Engineer Captain E. C. Smith, R.N. 18s. 8vo. (Cambridge University Press).

LISTS OF MEN-OF-WAR, 1650–1700. Part I, English Ships, 1649–1702, compiled by R. C. Anderson. Part II, French Ships, 1648–1700, compiled by Pieree Le Conte. Part III, Swedish Ships, compiled by Hj. Borjeson. Danish-Norwegian Ships, compiled by P. Holck. German Ships, compiled by W. Vogel and H. Szymanski. Part IV, Ships of the United Netherlands, 1648–1702, compiled by A. Vreugdenhil. 2s. 6d. each. (Society for Nautical Research Occasional Publications, No. 5). (Cambridge University Press).

DIE DEUTSCHEN KRIEGSSCHIFFE, 1815–1936. By E. Groner. 11s. 9d. Fo. (J. F. Lehmanns München).

MILITARY

THE TERRITORIAL ARMY, 2nd Edition. By Colonel C. R. Codrington. 4s. 6d. 8vo. (Sifton Praed & Co., Ltd.). Presented by the Publishers.

MACHINE GUNS: THEIR HISTORY AND TACTICAL EMPLOYMENT. By Lieut.-Colonel G. S. Hutchison. 15s. 8vo. (Macmillan & Co.). Presented by the Publishers.

HISTORY OF THE BOMBAY ARMY. By Sir Patrick Cadell. 18s. 8vo. (Longmans). Presented by the Publishers.

SIMPLIFIED TACTICAL INSTRUCTION. By Major G. M. Gamble. 2s. 6d. 8vo. (Gale & Polden, Ltd.). Presented by the Publishers.

THE AMERICAN CIVIL WAR, 1864–1865. By Major E. W. Sheppard. 6s. 6d. 8vo. (Gale & Polden, Ltd.). Presented by the Publishers.

THE PEOPLE'S ARMY. By Lewis Clive. 7s. 6d. 8vo. (Victor Gollancz, Ltd.). Presented by the Publisher.

REGIMENTAL HISTORIES

A SHORT HISTORY OF THE IRISH GUARDS, 1900 TO 1927. By T. H. Grayson. 1s. 8vo. (Printed by Benham & Co., Ltd., Colchester). Presented by the Author.

AIR

THE CHOSEN INSTRUMENT. By N. Macmillan. 5s. 8vo. (The Bodley Head).

ROYAL UNITED SERVICE INSTITUTION

Hundred-and-Seventh Anniversary Meeting

ON TUESDAY, 8TH MARCH, 1938, AT 3.30 P.M.

GENERAL SIR FELIX READY, G.B.E., K.C.B., C.S.I., C.M.G., D.S.O. (Chairman of the Council), in the Chair.

THE SECRETARY, Captain E. Altham, C.B., R.N., read the notice convening the meeting, which had been published in *The Times* on Monday, 23rd February, 1938.

ANNUAL REPORT FOR 1937

The Council have the honour to present their Annual Report for 1937.

The year has been an eventful and successful one for the Institution.

THE CORONATION.

On the occasion of the Coronation of His Majesty King George VI., a Loyal Address was sent by the Chairman in the name of the Council and Members of the Institution. A reply was received, in which the King was graciously pleased to convey "Their Majesties' warm thanks for the expression of loyalty and devotion which it contains."

To enable as many Members and their friends as possible to see the Royal Procession pass down Whitehall on Coronation day, stands were erected outside the Banqueting Hall and provision was made for 370 seats in and around that part of the Institution's premises. Further accommodation was provided for Members only in the Institution building. A running buffet and wireless reception added to the amenities.

VISIT OF THEIR MAJESTIES THE QUEEN AND QUEEN MARY.

Their Majesties The Queen and Queen Mary visited the Royal United Service Institution on the afternoon of 4th November. They were received by General Sir Felix Ready, G.B.E., K.C.B., C.S.I., C.M.G., D.S.O., the Chairman of the Council, and Captain E. Altham, C.B., R.N., Secretary and Chief Executive Officer, and were conducted round the Museum.

Their Majesties expressed great interest in the Institution's Collection and signed the visitors' book.

THE BANQUETING HOUSE.

Owing to recurring reports in the Press that it was under consideration to expel the Royal United Service Institution from the Banqueting House and utilize that building for Government entertaining; the Council thought

it desirable to bring to the notice of the First Commissioner of His Majesty's Works the circumstances in which the use of that part of the Institution's premises was given by Her Majesty Queen Victoria, and to request that they might be reassured that it would not be disintegrated by the deprivation of this Royal gift.

A reply was received stating that the First Commissioner of His Majesty's Works was "aware of the circumstances and conditions under which Queen Victoria granted the use of the Banqueting House, Whitehall, to the Royal United Service Institution in 1890, and that he is not unmindful of the distinguished character of the Museum which is housed therein. Sir Philip Sassoon feels that your Council will realise that he could not give any binding pledge that neither he nor his successors in office could, in any circumstances, ever be partners to or contemplate a change in the use of this building; but, for his part, he is sure that no proposal for a change would ever be made without the fullest consideration being given to the present and future requirements of the Institution." In view of the very specific nature of these requirements, which have been made known to and received the support of the Admiralty, War Office and Air Ministry, the Council regard this reply as satisfactory,

Vice-President.

Admiral Sir R. G. O. Tupper, G.B.E., K.C.B., C.V.O., has been re-elected a Vice-President for a further period of office.

Council.

Following the change in the Bye-Laws, Chapter III, para. 2 (*a*), passed at the Annual General Meeting in March, 1937, whereby the number of military members of the Council was reduced and the number of Air Force members increased by one, Air Vice-Marshal Sir Philip Game, G.C.V.O., G.B.E., K.C.B., K.C.M.G., D.S.O., was elected a member in the place of Lieutenant-General Sir C. J. C. Grant, K.C.B., K.C.V.O., C.B., D.S.O., who resigned on taking up an appointment in Scotland.

Vice-Admiral Sir W. F. French, K.C.B., C.M.G., was elected a naval member of the Council to fill the vacancy caused by the resignation of Admiral The Earl of Cork and Orrery, G.C.B., G.C.V.O., on his appointment as Commander in-Chief, Portsmouth.

Colonel J. K. Dunlop, O.B.E., M.C., T.D., was elected a Territorial Army member *vice* Colonel The Viscount Cobham, C.B., T.D.

Lieutenant-General Sir S. F. Muspratt, K.C.B., C.S.I., C.I.E., D.S.O., was elected the Indian Army member *vice* Lieutenant-General Sir R. C. Wilson, K.C.B., D.S.O., on the latter being appointed to a command in India.

The following Members of the Council, having completed three years service, retire but, with the exception of Colonel G. E. C. Rasch, offer themselves for re-election, for which they are eligible:—

Royal Marines.

Lieutenant-General W. W. Godfrey, C.B., C.M.G., R.M.

Royal Naval Volunteer Reserve.

Commodore The Earl Howe, C.B.E., V.D., R.N.V.R.

REGULAR ARMY.

Colonel G. E. C. Rasch, C.V.O., D.S.O.
General Sir Robert Whigham, G.C.B., K.C.M.G., D.S.O.

MILITIA.

Brigadier-General S. E. Massy-Lloyd, C.B.E.

TERRITORIAL ARMY.

Colonel F. D. Samuel, D.S.O., T.D.
Colonel B. Abel Smith, D.S.O., M.C., T.D., A.D.C.

This leaves one vacancy for the Regular Army, for which Major-General Sir B. N. Sergison-Brooke, K.C.V.O., C.B., C.M.G., D.S.O., has been nominated.

EX-OFFICIO MEMBERS.

General The Viscount Gort, V.C., K.C.B., C.B.E., D.S.O., M.V.O., M.C., succeeded Field Marshal Sir Cyril J. Deverell, G.C.B., K.B.E., on taking up the appointment of Chief of the Imperial General Staff.

Air Chief Marshal Sir C. L. N. Newall, K.C.B., C.M.G., C.B.E., A.M., succeeded Marshal of the Royal Air Force Sir E. L. Ellington, G.C.B., G.M.G., C.B.E., on taking up the appointment of Chief of the Air Staff.

Vice-Admiral Sir S. R. Bailey, K.B.E., C.B., D.S.O., succeeded Vice-Admiral Sir R. M. Colvin, K.B.E., C.B., on taking up the appointment of President of the Royal Naval College, Greenwich.

Captain W. S. Chalmers, D.S.C., R.N., succeeded Rear-Admiral B. C. Watson, D.S.O., on taking up the appointment of Director of the Royal Naval Staff College.

Major-General Sir Ronald F. Adam, Bart., D.S.O., O.B.E., succeeded Major-General The Viscount Gort, V.C., K.C.B., C.B.E., D.S.O., M.V.O., M.C., on taking up the appointment of Commandant of the Staff College, Camberley.

STAFF.

It is with deep regret that the Council have to record the death of Paymaster-Commander James Hogg, R.N., who had been Assistant Librarian of the Institution since that post was created in January, 1935.

They appointed Captain P. S. M. Wilkinson, late The Wiltshire Regiment, to fill the vacancy and he took up his duties on 1st June last.

MEMBERSHIP.

It is satisfactory that at the end of 1937 the Membership strength exceeded the 6,000 mark—a number never before recorded in the annals of the Institution.

The total number of Members on the roll at the end of 1937 was 6,004, as compared with 5,870 in 1936. During the past year 346 Members joined the Institution as compared with 542 in 1936. There were 87 withdrawals, as compared with 91 in 1936; 40 Life Members and 44 Annual Members died, and 41 Members were struck off for being two years in arrear with their subscriptions.

The details of Members joining are as follows:—

Regular Army	190
Royal Navy	50
Territorial Army	30
Indian Army	30
Royal Air Force	27
Dominion and Colonial Forces	10
Royal Marines	5
Civilians	2
Royal Naval Reserve	1
Royal Naval Volunteer Reserve	1
	346

This gives a net increase of 134. As the loss of Life Members does not affect the financial aspect, the financial gain on the year is 174 as compared with 353 in 1936, when the Entrance Fee was suspended.

Exemption from General Rates.

In March, 1936, the attention of the Council was called to the efforts made in 1852 to secure for the Institution exemption from payment of General Rates and the reasons why these failed, also the changes in the Institution's status subsequently brought about by the Royal Charter and the effect given thereto by the revision of the Bye-Laws in 1929. It was suggested that the two latter might enable the Institution to qualify for such exemption under the Scientific Societies Act of 1843 as now being a Society established exclusively for purposes of Science or Literature.

The necessary application was made to the Registrar of Friendly Societies, and on 6th April 1936 that official granted his Certificate of Exemption as required by the Act.

The Westminster City Council were duly apprised of this fact, but were not prepared to admit the claim. The Institution's Council were legally advised that the Registrar's Certificate was not conclusive. Before deciding to proceed further in the matter, however, they obtained the opinions of two Counsel. Both of them expressed the view that the Institution was qualified for exemption. Each of these opinions, in turn, was sent to the Westminster City Council with the object of avoiding litigation if possible, but that body regretted they were unable to depart from their previous decision.

It was thereupon decided to lodge an Appeal at the next County of London Sessions. The Case for the Institution was prepared by Messrs. Harrington Noble & Company—the Institution's solicitors, presented by learned Counsel, and heard on 7th May, 1937. Judgment was given in the Institution's favour, but the Westminster City Council decided to appeal to the High Court. The Appeal will come before a Divisional Court of the King's Bench Division early in 1938.

The General Rates levied on the Institution in 1936 amounted to £607 18s. 3d. per annum. The Council feel justified, therefore, in incurring the necessary expense to resist the appeal.

FINANCE.

The surplus of income over expenditure for 1937 amounts to £657 2s. 8d. as compared with a surplus of £349 8s. 4d. in 1936; but, in making this comparison, regard should be paid to the saving effected by non-payment of part of the year's Rates referred to above and dealt with in more detail below under Expenditure.

RECEIPTS.—The following is a comparison of receipts under the principal headings:—

	1937	1936
	£ s. d.	£ s. d.
Annual Subscriptions	5,725 2 6	5,533 0 0
Life Subscriptions	139 0 0	122 16 0
Museum Takings	1,561 15 6	1,567 19 0
Journal Sales	886 4 2	811 4 10

The increase in Annual Subscriptions is satisfactory as showing a steady influx of new Members. The improvement since 1935, when the Annual Subscriptions amounted to £5,075, is particularly noticeable. The Entrance Fee has remained suspended.

During the past year the Admiralty, War Office and Air Ministry restored the "economy cut" in their Grants, amounting to £80. Other exceptional receipts were a special grant of £100 by the Admiralty towards the restoration and correction of the Trafalgar Model, and a bequest of £45 from Mr. P. W. Reynolds.

EXPENDITURE.—There has been a saving of £454 12s. 8d. in respect to the non-payment of part of the year's Rates. Against this there has been expenditure on Legal Charges of £224 14s. 9d. in connection with the hearing of the Institution's appeal against rating. £200 taxed costs have been allowed in favour of the Institution, and this sum is held by Messrs. Harrington Noble & Company, Solicitors, against the expenses of the next hearing. The actual expenditure shown in the Revenue Account under the heading of Legal Expenses is, therefore, £24 14s. 9d.

The total cost of the work on the Trafalgar Model, now completed, was £175 11s. 8d., of which £132 1s. 8d. is debited to Expenditure in 1937.

THE REYNOLDS LEGACY.—The £45 received from this bequest was turned over to General Sir Robert Whigham's Committee to further the work of compiling a Summary of Information concerning Old Uniforms, Equipment, Standards and Colours—subjects in which Mr. Reynolds had a life-long interest—with the proviso that £20 should be ear-marked to provide a case for the Summary on which would be placed a suitable tablet.

LIFE SUBSCRIPTION FUND.—A sum of £250 has been withdrawn from the Life Subscription Deposit Account and invested in 2½ per cent. Conversion Stock 1944-49.

JOURNAL.

It is satisfactory to record that the Journal sales constitute a record in the annals of the Institution. The highest takings before the change of editorship in 1924 were £472 17s. 10d., as compared with £886 4s. 2d., for 1937. The revenue from advertisements has also improved and firms who

desire to attract the attention of Service readers, whether at home or abroad, are beginning to realise the very wide circulation which the Institution's publication enjoys and the advantages of advertising in it.

Special articles appeared in the May number in connection with His Majesty's Coronation.

The great expansion of the fighting Services and the rapid changes which are taking place in weapons and the conduct of warfare call for literary treatment by writers who are really up-to-date and who are acknowledged authorities and experts on these subjects. The Journal has been particularly fortunate in securing such contributors. Matters of high policy have been dealt with in lectures and articles on "The Army in India," by Field Marshal Sir Philip Chetwode; "Food Supplies in Time of War," by Sir Herbert Matthews; "Our Organization for War" by "Navarino"; and "The Administration, Organization and Direction of the Royal Air Force"; by "F.F.G.". Scientific and technical progress in the Services was represented by such contributions as Professor J. B. S. Haldane's lecture on "Science and Future Warfare"; Colonel G. le Q. Martel's "Mechanization"; and articles on "The Trend of Naval Construction," compiled by the Editor with the assistance of Mr. Maurice Prendergast, and "The Trend of Development in Aircraft" by Flying Officer A. C. Clinton, R.A.F.

Historical episodes of importance were treated by Rear-Admiral A. H. Taylor, in his lecture "Some New Aspects of the Battle of Trafalgar"; by Brigadier-General Sir J. E. Edmonds in his article on "The Fifth Army in March, 1918"; by Air Commodore P. F. M. Fellowes "Zeppelins in War and Peace"; and Major Oliver Stewart's review article, "The War in the Air."

International events during the past year have been seriously threatening the peace of the world, and have therefore called for special attention. The Journal has been fortunate in securing such contributions as "The Mediterranean Muddle," being the author's impressions after a long audience alone with Signor Mussolini; and "The United States and the Sino-Japanese War" written from the Presidential train on the return of Mr. Roosevelt from his trans-American tour—both from the pen of Mr. H. J. Whigham. The International Situation section, which, judging from correspondence, is particularly appreciated by our readers, is largely compiled by the Editorial Staff, with assistance from various authoritative sources of information.

Important pronouncements by the Government affecting the Services and summaries of White Papers on such matters as "Defence Expenditure" "Vulnerability of Capital Ships to Air Attack," and "The Control and Administration of the Fleet Air Arm" have been duly chronicled.

Books are, for the most part, reviewed by specialists on the subjects with which they deal, and there is no more reliable guide as to the contents and value of new Service publications than that to be found in this section of the Journal.

The Institution continues to be indebted to the Naval, General and Air Staffs, to the Imperial Defence College and the three Staff Colleges for their ready help in its mission of promoting and advancing science and literature appertaining to the three Services. The Council also wish to make their acknowledgments to the Military Secretary, India Office for his assistance in matters connected with the Indian Army, and to the Historical Section

of the Committee of Imperial Defence in regard to subjects relating to the history of the Great War. Their thanks are also tendered to those who contributed lectures, articles and letters to the 1937 volume of the Journal.

LIBRARY.

With the growing number of Members, the work of the Lending Library steadily increases. During 1937, 4,833 books were issued on loan, as compared with 4,773 in 1930—the last year when a previous computation was made.

A list of new books received between publication of successive numbers of the Journal is now posted in the Library.

Two hundred and eight new volumes were acquired during the year, exclusive of additional copies of certain works which have been in special demand.

MUSEUM.

Special Exhibitions.

The Special Exhibition depicting "Our Air Forces Past and Present" was succeeded on 1st February of the past year by one devoted to the history and dress of British Cavalry from the time of Cromwell to the present day. This gave scope for the display of some specimens of the Institution's fine collection of Cavalry uniforms, and for medals and personal relics of our most famous Cavalry leaders. The latter were augmented by many interesting items lent by their descendants. The Exhibition also included a selection of pictures of cavalry engagements from the Crookshank collection.

This Exhibition gave place to one which was specially arranged in connection with the Coronation celebrations. The latter included an Imperial Section with portraits of our Royal Patrons, Royal gifts and relics and exhibits and pictures depicting the part played by the Services in building the Empire; A Naval Section with miniature models of every British warship present at the Naval Review; a Military Section which included the newly-presented dioramas; and an Air Force Section illustrating by scale models in appropriate settings, the development of our Air Forces from the time of the Royal Naval Air Service and Royal Flying Corps to that of the expansion of the Royal Air Force in the present day.

New Exhibits.

The Museum has been greatly enriched during the past year by the very beautiful dioramas presented by Mr. Otto Gottstein. These depict thirteen historic battles or events of military and Imperial significance. They are of exceptional value both from an educational point of view and as a record of the character of the fighting and of the equipment of our armed forces at the dates they represent.

Mr. Gottstein has also had specially made for the Institution a unique series of scale models depicting the development of military machines and long-range weapons since the time of the Assyrians up to the Waterloo period. The series is brought up-to-date by the Institution's previous collection of models of tanks, armoured cars and present-day field ordnance.

The Institution has received two very valuable additions to the many sets of Orders, Decorations and Medals of distinguished commanders which are given an honoured resting place in the Banqueting Hall. Lady Madden has presented those which belonged to the late Admiral of the Fleet Sir Charles Madden, Bart.; and Captain R. V. Eyre, R.A., those of Field Marshal Lord Clyde. Field Marshal Sir Philip Chetwode has presented the sword of a General in the Nepalese Army together with a sacrificial sword, which were given to him on being made a General in the Nepalese Army. The Institution is indebted to other donors for sixty further gifts.

Restoration and Correction of the Trafalgar Model.

The restoration and correction of the Trafalgar Model, which had been confided to a special committee presided over by Admiral Sir William Goodenough, G.C.B., M.V.O., has been completed.

Rear-Admiral A. H. Taylor, O.B.E., was largely responsible for supervising the details, and the work was ably carried out by Mr. F. E. Hills.

The model is now well lit, and for accuracy and realism it is the finest existing reproduction in miniature of Nelson's last and greatest victory.

UNIFORMS, COLOURS, STANDARDS AND EQUIPMENT OF THE BRITISH ARMY

Good progress has been made in compiling the Summary of Information on the old uniforms, equipment, standards and colours of the British Army, which has engaged the attention of a Committee of experts under General Sir Robert Whigham, G.C.B., K.C.M.G., D.S.O., for the past two and a half years.

A meeting of Regimental Representatives, who are Associate Members of this Committee, and others interested in the subject which was held in the lecture theatre on 15th October, was well attended. Effect will be given to the proposal made on that occasion that a similar meeting should take place annually.

Captain Donald Anderson, late Indian Army, has been engaged to compile the Summary, and Regimental Representatives have been invited to communicate with him in regard to their own, indispensable share of the work.

ROYAL UNITED SERVICE INSTITUTION.

BALANCE SHEET, 31st DECEMBER, 1937.

DR. CR.

	£ s. d.	£ s. d.
To ACCUMULATED FUND—		
Excess of Assets over Liabilities, as at 31st December, 1936	98,644 4 11	
Add: Additions to Museum Exhibits during the year, per contra	7,587 10 0	
Less: Withdrawals, per contra	40 0 0	
	7,547 10 0	
	106,191 14 11	
Deduct: Depreciation of Investments since 31st December, 1936	375 0 4	
	105,816 14 7	
Add: Revenue Account—Surplus per annexed Account	657 2 8	
		106,473 17 3
„ MUSEUM EXHIBITS PURCHASE FUND ..		11 16 0
„ LEASEHOLD REDEMPTION FUND		3,861 15 10
„ LIFE SUBSCRIPTION FUND		1,389 6 2
„ SUBSCRIPTIONS, Etc., PAID IN ADVANCE		162 15 6
„ CREDITORS & PROVISION FOR CONTINGENCIES		1,314 8 1
Note.—There is a contingent liability in respect of a rating assessment and legal costs arising from an Appeal lodged by the Rating Authorities		
BERTRAM ABEL SMITH, *Chairman, Finance Committee.*		
E. ALTHAM, *Secretary.*		
		£113,213 18 10

	£ s. d.	£ s. d.
By LEASEHOLD BUILDING—Whitehall, S.W.1, at Cost (covered by Insurance for £40,000) ..		23,101 16 8
„ FURNITURE, FIXTURES, FITTINGS, BOOKS MAPS, CHARTS, etc. (as valued for Insurance at 31st December, 1926, with subsequent additions at cost)		10,229 0 6
„ MUSEUM EXHIBITS, etc. (excluding Loan Collection)—		
As at 31st December, 1936	49,523 10 0	
Additions during the year	7,587 10 0	
	57,111 0 0	
Deduct: Withdrawals during the year ..	40 0 0	
		57,071 0 0
NOTE: The Museum Exhibits, including Loan Collection (£11,172 15s. 0d.) are covered by Insurance for £68,443 15s. 0d.		
„ LEASEHOLD REDEMPTION FUND—		
Premiums paid to 31st December, 1936, on Insurance Policies for £23,100 expiring October, 1972	3,795 12 3	
Add: Premium paid during year	66 3 7	
		3,861 15 10
„ LIFE SUBSCRIPTION FUND—		
£945 0s. 5d. 2½% Conversion Loan, 1944–49, at market price, 31st December, 1937 ..	926 2 5	
Cash at Bank on Deposit Account	463 3 9	
		1,389 6 2
„ INVESTMENTS at Market Price, 31st December, 1937—		
£1,653 16s. 2d. 3½% India Stock ..	1,538 0 10	
£14,202 16s. 0d. 3% Conversion Loan 1948-53	14,415 16 10	
		15,953 17 8
„ DEBTORS AND AMOUNTS PAID IN ADVANCE		536 4 5
„ CASH AT BANK AND IN HAND		1,070 17 7
		£113,213 18 10

TO THE MEMBERS OF THE ROYAL UNITED SERVICE INSTITUTION.

We have audited the above Balance Sheet dated 31st December, 1937, and have obtained all the information and explanations we have required. In our opinion such Balance Sheet is properly drawn up so as to exhibit a true and correct view of the Institution's affairs according to the best of our information and the explanations given to us and as shown by the books of the Institution.

ALDERMAN'S HOUSE,
BISHOPSGATE, LONDON, E.C.2.
9th February, 1939.

BARTON, MAYHEW & Co.,
Chartered Accountants.
Auditors.

REVENUE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1937.

DR.

1936.						
£	s.	d.		£	s.	d.
2,397	8	0	To Salaries	2,391	18	4
1,929	16	4	,, Wages and National Insurance	1,973	1	8
25	15	2	,, Attendants' Clothing	34	8	1
123	10	0	,, Pensions	156	10	0
						4,555 18 1
94	6	11	,, Museum Repairs, Sundries and Special Exhibitions			226 6 1
1,512	5	3	,, Journal Printing	1,554	11	5
332	4	10	,, Journal Postage	355	19	4
294	11	6	,, Literary Services	236	1	6
36	4	10	,, Shorthand Notes	36	14	10
						2,183 7 1
157	12	3	,, Library Purchase and Binding of Books	181	15	0
54	10	3	,, Periodicals and Newspapers	52	11	8
						234 6 8
16	9	6	,, Advertising	19	1	6
3	3	0	,, Lecture Expenses	1	11	6
						20 13 0
580	0	0	,, Ground Rent	580	0	0
60	14	6	,, Water Rate	61	10	1
607	18	3	,, General Rates	153	5	7
104	19	5	,, Insurance	98	11	4
						893 7 0
123	4	1	,, Fuel	121	9	5
238	15	5	,, Lighting	250	15	10
51	13	3	,, General Repairs	122	3	2
89	0	5	,, House Sundries and Expenses	126	19	9
						621 8 2
52	10	0	,, Audit Fee, 1937	52	10	0
23	12	0	,, Legal Expenses	24	14	9
95	18	11	,, Postages, Telegrams, etc.	80	10	1
224	17	10	,, Printing and Stationery	263	15	4
37	17	10	,, Telephone	40	3	3
						461 13 5
			,, Travelling Expenses			10 1 3
128	3	2	,, Contribution to Staff Pension Scheme			123 9 8
66	3	7	,, Leasehold Redemption Fund			66 3 7
13	9	4	,, Gold Medal for R.U.S.I. Prize Essay, 1936			13 4 6
349	8	4	,, Balance, being surplus for the year, carried to Balance Sheet			657 2 8
£9,826	4	2				£10,067 1 2

CR.

1936						
£	s.	d.		£	s.	d.
5,533	0	0	By Members' Subscriptions Received	5,725	2	6
4	16	0	,, Voluntary Extra Subscriptions	4	16	0
122	16	0	,, Life Subscriptions—Amount brought to Credit	139	0	0
37	16	0	,, Entrance Fees			5,868 18 6
1,567	19	0	,, Admissions to Museum	1,561	15	6
55	3	9	,, Sales of Museum Catalogues and Pamphlets	67	15	5
						1,629 10 11
811	4	10	,, Sales of Journal	886	4	2
274	9	0	,, Advertisements in Journal	321	17	4
						1,208 1 6
19	8	6	,, Profit on Repairing Regimental Colours, etc.	27	13	6
228	16	10	,, Miscellaneous Receipts	80	9	2
						108 2 8
500	14	3	,, Dividends and Interest Received			502 7 7
670	0	0	,, Government Grants			750 0 0
£9,826	4	2				£10,067 1 2

CHESNEY MEMORIAL MEDAL FUND.

DR. 31st DECEMBER, 1937. CR.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance of Fund at 31st December, 1936 :—			By depreciation of Investment since 31st December, 1936		6 18 0
Cash at Bankers	9 3 7		„ Balance of Fund at 31st December, 1937 :—		
Investment at Market Price	221 19 0		Cash at Bankers	16 2 5	
		231 2 7	Investment at Market Price :		
„ Dividends Received, less Tax		6 18 10	£230 Bengal & North Western Railway 3½% Preference Stock	215 1 0	
					231 3 5
		£238 1 5			£238 1 5

We have audited the above Statement of the Chesney Memorial Medal Fund for the year ended 31st December, 1937, and certify the same to be correct.

ALDERMAN'S HOUSE,
BISHOPSGATE, LONDON, E.C.2.
9th February, 1938.

BARTON, MAYHEW & Co.,
Chartered Accountants.
Auditors.

TRENCH GASCOIGNE PRIZE FUND.

DR. 31st DECEMBER, 1937. CR.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance of Fund at 31st December, 1936 :—			By First Prize Essay, 1936	31 10 0	
Cash at Bankers	79 6 6		„ Second Prize Essay, 1936	21 0 0	
Investments at Market Prices	1,660 5 5				52 10 0
		1,739 11 11	„ Depreciation of Investments since 31st December, 1936		68 18 5
„ Dividends Received, less Tax		42 4 10	„ Balance of Fund at 31st December, 1937 :—		
„ Dividends Received, Gross		3 10 0	Cash at Bankers	72 11 4	
			Investments at Market Prices :		
			£1,862 London & North Eastern Railway 3% Debenture Stock	1,489 12 0	
			£100 3½% War Loan	101 15 0	
					1,663 18 4
		£1,785 6 9			£1,785 6 9

We have audited the above Statement of the Trench Gascoigne Prize Fund for the year ended 31st December, 1937, and certify the same to be correct.

ALDERMAN'S HOUSE,
BISHOPSGATE, LONDON, E.C.2.
9th February, 1938.

BARTON MAYHEW & Co.,
Chartered Accountants.
Auditors.

BRACKENBURY MEMORIAL FUND.

DR. — 31st DECEMBER, 1937. — CR.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance of Fund at 31st December, 1936 :—			By Expenditure on Books, etc.		12 13 9
Cash at Bankers	9 8 3		„ Royal United Service Institution— Administration Fee		1 1 0
Investment at Market Price	444 4 2		„ Depreciation of Investment since 31st December, 1936		15 15 10
		453 12 5	„ Balance of Fund at 31st December, 1937 :—		
„ Dividends Received, Gross		14 14 8	Cash at Bankers	10 8 2	
			Investment at Market Price £421 1s. 0d. 3½% War Loan	428 8 4	
					438 16 6
		£468 7 1			£468 7 1

We have audited the above Statement of the Brackenbury Memorial Fund for the year ended 31st December, 1937, and certify the same to be correct.

ALDERMAN'S HOUSE,
BISHOPSGATE, LONDON, E.C.2.
9th February, 1938.

BARTON, MAYHEW & Co.,
Chartered Accountants.
Auditors.

EARDLEY-WILMOT MEDAL FUND.

DR. — 31st DECEMBER, 1937. — CR.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance of Fund at 31st December, 1936 :—			By Depreciation of Investment since 31st December, 1936		2 17 6
Cash at Bankers	13 11 9		„ Balance of Fund at 31st December, 1937		
Investment at Market Price	117 7 6		Cash at Bankers	18 11 9	
		130 19 3	Investment at Market Price : £100 5% Conversion Loan, 1944–64 ..	114 10 0	
„ Dividends Received, Gross		5 0 0			133 1 9
		£135 19 3			£135 19 3

We have audited the above Statement of the Eardley-Wilmot Medal Fund for the year ended 31st December, 1937, and certify the same to be correct.

ALDERMAN'S HOUSE,
BISHOPSGATE, LONDON, E.C.2.
9th February, 1938.

BARTON, MAYHEW & Co.,
Chartered Accountants.
Auditors.

THE CHAIRMAN'S ADDRESS

The first Resolution on the Agenda is "That the Report and Accounts, as circulated, be taken as read and adopted," and following the custom of my predecessors, I should like to make a few short remarks in moving that Resolution.

Just a year ago, on the threshold of a new reign, it was cordially agreed at the Anniversary Meeting that a Loyal Address should be sent to our Royal Patron, King George VI, on the occasion of his Coronation. This was duly done, and a copy of the Address and His Majesty's gracious reply were published in the JOURNAL for last August.

Her Majesty the Queen did us a special honour in paying her first visit to the Institution during the busy months of the Coronation year. It is interesting to recall that Her Majesty Queen Mary, who came with the Queen, last visited us during the Institution's Centenary Year, 1931, when she was accompanied by King George V.

In the Annual Report you will see mention made of an exchange of letters between the Council and the First Commissioner of His Majesty's Works on the subject of the Institution's right to the occupation of the Banqueting Hall. The Council regard the royal gift of the use of this historical building as one of our most cherished privileges, and the fact that for well over a hundred years the Institution has been established in or very near Whitehall as one of its indispensable advantages to the Services. Members may be assured that their interests in these matters will continue to be jealously guarded.

As a result of the change in the Bye-Laws governing the constitution of the Council, passed at last year's meeting, Air Vice-Marshal Sir Philip Game was elected as the second Royal Air Force Member. He was also good enough to accept service as Vice-Chairman. Just prior to this Meeting, the Council elected him their Chairman for the ensuing year, and he will have the distinction of being the second Royal Air Force Chairman on our Roll; the first was also his immediate predecessor in another and more exacting office—Marshal of the Royal Air Force Lord Trenchard.

Last year it was intimated that if the progress in enrolling new Members was maintained, we might hope to pass the 6,000 mark for the first time in the Institution's history. You will see in the Report that that forecast has been fulfilled.

Colonel Abel Smith and his Finance Committee have again produced a satisfactory Balance Sheet and Revenue Account. They have pursued a conservative policy pending the final result of legislation in regard to exemption from Rates.

Admiral Sir Reginald Tupper and his Journal and Library Committee maintain those two most important attributes of the Institution at the high standard of interest and utility which we have come to expect.

Admiral Sir William Goodenough and the Museum Committee must be congratulated on two very notable achievements during the past year—the restoration and correction of what is now the most perfect model of Trafalgar, which is a central feature in the Banqueting Hall; and the acquisition of the very beautiful and valuable military dioramas, presented by Mr. Gottstein, which have been installed in the Crypt.

Finally, General Sir Robert Whigham has earned our thanks for the work of his Committee and the growing interest which they are arousing throughout the Army in old military uniforms, accoutrements, standards and colours—matters with which the Institution has been very closely associated ever since it was founded.

If you will turn to the Report, it will be convenient to take each section in turn :—

Colonel Abel Smith will deal with any questions regarding the Finance Section. (No questions were asked.)

Then we will pass on to the next section. Admiral Sir Reginald Tupper will be very glad to answer any questions concerning the Journal and Library Section of the Report. (No questions were asked.)

Admiral Sir William Goodenough, the Chairman of the Museum and General Purposes Committee, is unavoidably prevented from being present. If anyone wishes to ask any questions on that section of the Report I will try to answer them. (No questions were asked.)

Then, as there are no questions, I will now move : "That the Report and Accounts, as circulated, be taken as read and adopted."

COLONEL ABEL SMITH (Chairman of the Finance Committee) seconded the Resolution, which was carried unanimously.

RE-ELECTION OF AUDITORS

BRIGADIER-GENERAL W. W. SEYMOUR : I beg to move "That Messrs. Barton, Mayhew & Company be re-elected Auditors for the ensuing year at a fee of fifty guineas."

COMMANDER R. I. MONEY, R.N., seconded the Resolution, which was carried unanimously.

VACANCIES ON THE COUNCIL

THE CHAIRMAN : The next item on the agenda is to fill the vacancies on the Council. The following have been nominated as candidates for those vacancies :—

ROYAL MARINES (1 vacancy)

Lieutenant-General W. W. Godfrey, C.B., C.M.G., R.M.

ROYAL NAVAL VOLUNTEER RESERVE (1 vacancy)

Commodore the Earl Howe, C.B.E., V.D., R.N.V.R.

REGULAR ARMY (2 vacancies)

Major-General Sir B. N. Sergison-Brooke, K.C.V.O., C.B., C.M.G., D.S.O.
General Sir Robert Whigham, G.C.B., K.C.M.G., D.S.O.

MILITIA (1 vacancy)

Brigadier-General S. E. Massy-Lloyd, C.B.E.

TERRITORIAL ARMY (2 vacancies)

Colonel F. D. Samuel, D.S.O., T.D.
Colonel B. Abel Smith, D.S.O., M.C., T.D., A.D.C.

These nominees were unanimously elected.

GOLD MEDAL ESSAY COMPETITION (NAVAL), 1937

THE SECRETARY : The winner of the Gold Medal of the Institution and the First Trench Gascoigne Prize of thirty guineas for the 1937 Competition is

Lieutenant N. McI. Kemp, R.N. He is now serving in H.M.S. " Courageous " and cannot be here this afternoon.

The Second Trench Gascoigne Prize has been divided. The Council added ten guineas to the usual award, so that each prize-winner gets fifteen guineas. The winners are Commander G. C. P. Menzies, R.N., who is now serving in H.M.S. " Regulus " in China, and therefore cannot be here, and Captain G. K. Bourne, R.A., who is present.

THE CHAIRMAN presented the prize to Captain Bourne, amid applause.

THE CHAIRMAN: I am sure you would like to offer your congratulations also to the other two successful competitors, who are not here to-day. (*Applause.*)

Lieutenant Kemp has already won the Medal and Prize as a Sub-lieutenant, now he has won them as a Lieutenant, and I am sure we should all like to see him win them as a Commander. (*Applause.*)

VOTE OF THANKS TO THE CHAIRMAN

AIR VICE-MARSHAL SIR PHILIP GAME: It is the privilege of the new Chairman to propose a Resolution of thanks to the retiring Chairman, and it gives me very great pleasure to move that the thanks of the Institution be accorded to Sir Felix Ready.

I am sure the Council and the Institution as a whole must have realized that they were doubly fortunate last year in securing the services of Sir Felix Ready for a second year as Chairman. (*Applause.*) The Vice-Chairman, Admiral of the Fleet the Earl of Cork and Orrery, had to retire on his appointment as Commander-in-Chief at Portsmouth; it was in the middle of the Coronation year, and a double change would have been very unfortunate indeed.

We are all, I am sure, deeply grateful to Sir Felix for his leadership and for all the hard work that he has carried out as Chairman of the Council for the last two years. (*Applause.*) I am very sorry to see him vacate the Chair.

It is with great pleasure that I propose a vote of thanks to him for having held the fort so well and so devotedly for the last two years. (*Applause.*)

ADMIRAL SIR R. G. O. TUPPER: I have great pleasure in seconding this motion.

I know that we on the Council are all grateful to Sir Felix Ready. We are always very pleased to meet each other and sit with each other, but Sir Felix carries through our labours on the Council with such expedition that to-day we were only a quarter of an hour at our Council meeting, and last time I had the pleasure of being present at a Council meeting it lasted only half an hour. At one time I had the pleasure of presiding, and I sometimes found it difficult to get through the business in an hour. In this matter the Army has definitely beaten the Navy!

The motion was carried with acclamation.

THE CHAIRMAN: I am very grateful to you all for giving me your thanks in that way.

I should like to take this opportunity of expressing my thanks to our most efficient Secretary, Captain Altham, and his very capable staff, who work so well under him. (*Applause.*) They have made the so-called honorous duties of the Chairman very light and pleasant.

That concludes the business of the Meeting.

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